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CONTENTS

DEPARTMENTS

	Pages
Editorials	58
What the Rubber Chemists Are Doing	59
New Machines and Appliances	60
Goods and Specialties	62
Rubber Industry in United States	63
Canada	67
Obituary	67
Financial	68
New Incorporations	70
From Our Columns	70
Rubber Industry in Europe	71
Far East	73
Book Reviews	74
New Publications	74
Rubber Bibliography	75
Patents	76
Trade Marks	78
Lists Available	79
Rubber Trade Inquiries	90
Foreign Trade Information	90

MARKET REVIEWS

Crude Rubber	79
Reclaimed Rubber	80
Rubber Scrap	80
Compounding Ingredients	83
Cotton and Fabrics	86

STATISTICS

Canada, Two Months Ended February, 1940	92
United States and World, of Rubber Imports, Exports, Consumption, and Stocks	86
for February, 1940	90
Imports by Customs Districts	90
Crude and Waste Rubber, for 1940	88
Latex	84
Production, Footwear	86
Tire	80
Reclaimed Rubber	80
World and United States of Rubber Imports, Exports, Consumption, and Stocks	86
Net Imports of Crude Rubber	88
Shipments of Crude Rubber from Producing Countries	92
CLASSIFIED ADVERTISEMENTS	89
ADVERTISERS' INDEX	98

ARTICLES

Composite Elasticity of Rubber — I — H. MARK — 41

Distributers' Tire Stocks in the United States, April 1, 1940 — 46

"Vinylite" Series V Resins — J. R. PRICE — 47

Latex Improves Biological Models and Injected Specimens — J. RUBINGER — 50

Report of the Crude Rubber Committee, Division of Rubber Chemistry, A. C. S. — 53

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Composite Elasticity of Rubber—I

H. Mark[1]

THE elastic behavior of rubber is of such a complex nature that serious difficulties have been encountered in efforts to obtain a satisfactory quantitative explanation of this phenomenon. However intense scientific interest in rubber has led to numerous attempts to solve this important problem.[2] In recent years general progress in the field of high polymeric chemistry has contributed the following facts, which have encouraged new efforts to answer this old question with better expectation of success.

(1) The molecular structure of rubber and other highly elastic natural substances has been cleared up to a reasonable extent. It can be assumed with good reason that all these materials are built up of long chain-like molecules, which have a certain internal flexibility.

(2) Recent physical measurements on rubber have given quantitative information regarding its thermo-elastic behavior at low stresses. X-ray investigations of rubber under different conditions have thrown light on the crystallization process, which goes on during the extension of this material.

(3) Synthetic materials have been prepared which show rubber-like elasticity, and the internal structure of which can be ascertained to a fair degree from the way in which they are produced. Their behavior during elongation has been studied.

This progress has greatly increased and improved the available experimental material on which every successful theoretical treatment of rubber elasticity must be founded and by which the justification of each hypothesis or assumption has to be checked.

Nature of Rubber Elasticity

It seems that the following conception of rubber-like elasticity agrees fairly well with the experimental facts of all of the older and newer investigations in this field. The high elasticity of long chain compounds is of a composite type. During the extension of such a material at least three different elementary processes take place.

(1) At the lowest stresses an unfolding and unrolling of entangled wound-up and partially interlocked molecular chains take place; the chains, owing to their internal mobility, behave like soft worms and exhibit in their entirety the elasticity of a soft flexible network. Through this first range, contraction is not caused by forces, but by the kinetic energy of the individual links of the network. The elasticity is of the same type as that of an ideal gas.

(2) With increased stretching of the chains a type of crystallization process begins to take place, produced by the intermolecular forces between chains. The sample in this state consists of two phases: an amorphous-liquid phase of mobile entangled chains and a crystallized-solid phase of immobile rigid chains, bundled together through van der Walls' forces. These two phases are in reversible equilibrium with each other. During crystallization no force is necessary to extend the sample as long as enough crystallization nuclei are present. Crystallization favors extension; while melting favors contraction.

(3) As soon as the larger part of the material is crystallized, the sample behaves like a polycrystalline solid body (copper, marble, granite, etc.) and exhibits the elastic behavior of such a substance. Each atom oscillates around a fixed equilibrium position; if stress is applied, these equilibrium positions are shifted, and potential energy is accumulated in the sample. As soon as the external strain ceases, the forces between the atoms restore the latter to their original position. The contraction is due to interatomic forces, and the elasticity is of the same type as that of steel, granite, or diamond.

These three elementary processes are not strictly separated from each other during extension. At the start of the elongation curve (up to about 100% extension) the first process prevails. Later it exists with the second process and still later with the second and the third. At the very end of the curve (where the sample assumes the properties of a hard and stiff substance) the third process plays the overwhelming role.

Figure 1 shows in a schematic way how these three elementary mechanisms contribute to the total behavior

[1] International Paper Co., Hawkesbury, Ont., Canada.

[2] For comprehensive treatments see: "Plantation Rubber and the Testing of Rubber," G. S. Whitby, London, 1920; "The Science of Rubber," K. Memmler, New York, 1934; "Kautschuktechnologie," E. A. Hauser, Berlin, 1934; "Chemistry and Technology of Rubber," C. C. Davis and J. T. Blake, New York, 1937; "Elasticity and Plasticity," R. Houwink, Cambridge, 1937.

of the material. At which point and to what extent the different elementary processes overlap depend upon the nature of the substance and upon the conditions of the experiments. In regard to the nature of the material, the following are influencing factors: length of chain molecules; internal mobility of the individual chains; and forces between the chains (crystallization forces and main valence cross linkages).

The experimental conditions which mainly influence the processes concerned are temperature and rate of stretching.

As each of the three elementary processes mentioned above is influenced by the foregoing factors, it is therefore evident that the composite elasticity made up of the three processes represents a rather intricate and complicated example of mechanical behavior. Indeed the actual elastic behavior of rubber-like substances is very complicated and intricate; it therefore seems necessary, in order to deal with this problem, to work out as far as possible the conception of an elasticity composed of the three elementary processes mentioned above. In order to do this it will first be necessary to describe in more detail each of the processes concerned and later attempt to combine the different steps in a reasonable manner. It is therefore deemed advisable to divide further discussion of this subject into the following sections: elastic behavior of samples with flexible entangled chain molecules; equilibrium between amorphous and crystallized phase; the elasticity of the crystallized phase; composite elasticity; and other influencing factors. The first-mentioned section will be discussed in Part I of this article; while the last four will be covered in Part II, to appear later.

Elastic Behavior of Materials with Flexible Entangled Chain Molecules

The outstanding feature of soft rubber is that it can be stretched considerably by rather weak forces and yet retain nearly complete reversible elongation. This fact makes it highly improbable that the contraction of the extended sample is caused by interatomic or intermolecular forces. Both types of forces would resist much more drastically a displacement of the elementary particles from their equilibrium position and could never act over such wide ranges or permit reversible elasticities up to 1,000%.

TABLE 1. MODULI OF ELASTICITY

Substance	E in Dynes per Sq. Cm.
Aluminum	$6.0 - 7.0 \cdot 10^{11}$
Copper	$1.0 - 1.3 \cdot 10^{12}$
Silk	$1.0 - 1.2 \cdot 10^{12}$
Polystyrene	$3.2 - 2.9 \cdot 10^{10}$
Frozen rubber	$1.0 \cdot 10^{11}$
Soft raw rubber	$1.0 - 2.0 \cdot 10^{8}$
Polybutadiene	$5.0 \cdot 10^{8}$
Ideal gas	$2.0 \cdot 10^{6}$

Table 1 gives the moduli of elasticity, E, for several materials, showing that substances which are affected by the action of interatomic forces produce E values around 10^{12}/ dynes per square centimeter (comp. e.g., Al, Cu, silk, etc.); while rubber and related synthetic products have moduli in the range of 10^{6} dynes per square centimeter. On the other hand the elastic modulus of an ideal gas under normal conditions is of the order of magnitude of 10^{6} dynes per square centimeter. This elasticity, of course, is not due to interatomic forces, but to the irregular thermo-kinetical movement of the different elementary particles in the gas.

Therefore it may be worthwhile to determine whether or not the elasticity of soft rubber is the same type as the elasticity of a gas. This conception may seem strange as we are accustomed to consider rubber as a solid body, but, in fact, technical men have long realized this peculiar relation. Hence they nearly always use soft rubber in conjunction with air when producing a highly elastic, but soft combination such as a ball, tube, or tire.

The idea of attributing the highly reversible elasticity of elastic animal materials like muscles to kinetic rather than to potential energy was first proclaimed by E. Wolisch.[3] Soon afterward K. H. Meyer[4] extended and intensified considerably this line of research. Since then R. E. Burk,[5] F. W. Busse,[6] H. Dostal,[7] H. Eyring,[8] E. Guth and H. Mark,[9] L. M. Huggins,[10] W. Kuhn,[11] W. Neumann,[12] L. S. Ornstein,[13] H. Pelzer,[14] and others added valuable contributions to the experimental and theoretical development of this field. The most elaborate treatment of the problem is to be credited to W. Kuhn, who recently has also considered systematically the general features of composite elasticity.[15]

In order to understand the behavior of a material which is built up of a great number of long chain-like molecules, we must first determine how a single isolated chain molecule behaves and if it is in thermal equilibrium with its surroundings. Let us take a very simple case, an isolated normal hydrocarbon chain with n C-C bonds, having the chemical formula $C_{n+1}H_{2n+4}$; n can be between 100 and 10,000. This structure, of course, is much simpler than natural rubber or any of the synthetic rubber-like substances which chiefly represent substituted hydrocarbon chains and always contain a certain number of double bonds. Natural rubber, for instance, has a methyl group attached to each fourth carbon atom and one double bond on every fourth chain link. Buna rubber is unsubstituted, but has one double bond on every fourth chain link and contains a certain percentage of other molecules (styrene or acrylic derivatives) as copolymers. Neoprene contains one chlorine atom and one double bond on each group of four carbon atoms in the straight chain. All these differences in structure cause the free mobility of subsequent chain links to be decreased in comparison with a simple hydrocarbon chain. This difference, however, does not influence the results of our calculations when the chains are of sufficient length.

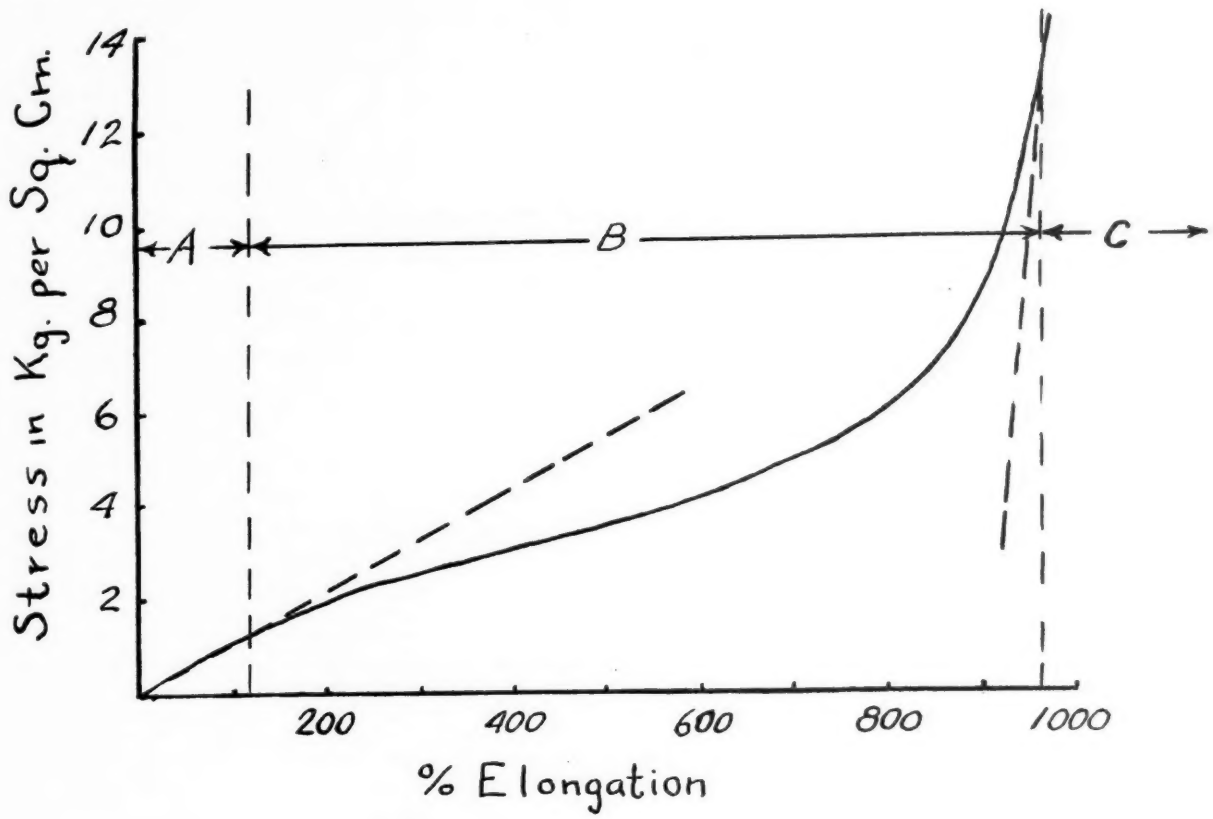
From W. H. and W. L. Bagg's X-ray studies on diamond[16] and from a long series of other investigations on organic compounds, we know that the distance l_0 between two subsequent C atoms is 1.54 Å. Stereochemistry teaches us that the angle α between two carbon bonds is about 109°. If we stretch the chain to its maximum length, as is shown in Figure 2, the distance between the first and last C atom will be given by

$$r_{max} = L = (n - 1)\, l_0 \sin \frac{\alpha}{2} \qquad (1)$$

It may be readily seen that this maximum chain length L can be obtained only when all linkages lie in the same plane, building up the zigzag band as shown in Figure 2.

On the other hand a shorter distance, r, between the first and last carbon atom may be obtained in many different ways. Owing to the flexibility of the chain there are many possible ways to arrange the different links of the chain without varying the distance, r, between the two ends.

[3] E. Wolisch and R. de Rochemont, *J. S. Biol.*, 85, 406 (1927).
[4] K. H. Meyer, G. v. Susich, and E. Valko, *Koll. Z.*, 59, 208 (1932).
[5] R. E. Burk and L. Laskowska, *J. Chem. Phys.*, 7, 465 (1939).
[6] *Ibid.*, 36, 2863 (1932).
[7] *Monatsh.*, 71, 144, 309, 346 (1938).
[8] *Phys. Rev.*, 39, 746 (1932).
[9] *Monatsh.*, 69, 93 (1934); *Naturwissenschaften*, 25, 353 (1937).
[10] *J. Chem. Phys.*, 8, 181 (1940).
[11] *Koll. Z.*, 68, 2 (1934), 76, 258 (1936), 87, 3 (1939).
[12] V. Hauk and W. Neumann, *Monatsh.*, 72, 22 (1938).
[13] L. S. Ornstein, J. Wouda, and J. G. Eymers, *Proc. Australasian Inst. Mining & Met.*, 32, 1235 (1929), 33, 273 (1930).
[14] *Monatsh.*, 71, 444 (1938).
[15] *Ang. Chem.*, 52, 289 (1939).
[16] See "X-Rays and Crystal Structure," IV Ed., London, 1933.



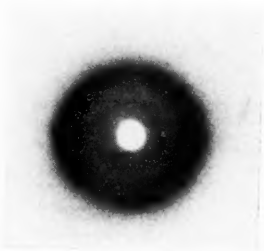
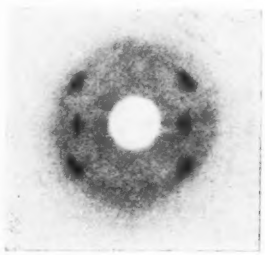
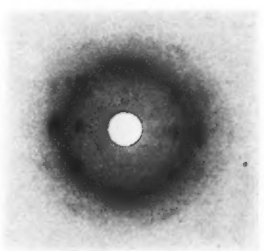
	Region of Curve—A Range of Pure Gas Elasticity	Region of Curve—B Range of Gas-Crystal Elasticity	Region of Curve —C Range of Pure Crystal Elasticity
E in Kg. per Sq. Cm.	1 to 3	Intermediate Values	10^4 to 10^5
Influence of Absolute Temp. on E	Proportional to T	Fairly Complicated	Proportional to 1/T
Extension Curve	$\sigma = Z\,k'\,T\,\Delta l$	$\sigma = -\frac{\lambda}{\Delta l} \cdot \ln T_s + \text{const.}$	$\sigma = E'\,\Delta l$
Internal Structure	One Amorphous Phase	Equilibrium between the Amorphous and Crystallized Phase	One Crystallized Phase
X-Ray Diagram			
	Amorphous	Mixed	Crystalline

Fig. 1. Stress-Strain Curve of Rubber Divided into Three Ranges of Elasticity with the Properties of Each Range Defined

For every given r a definite number of possibilities exist, which, according to Boltzmann, can also be called the "complexities" for the given distance between the ends of the chains. In order to calculate these "complexities" as a function of r it is necessary to make certain assumptions regarding the constitution of the chain and the mobility of its parts. If l_0 is the length of one chain link, n the number of links, and α the angle between two subsequent links, and if absolutely free rotation is assumed, then the probability, W, that the distance between the two chain ends corresponds to r is represented by

$$W(n, l_0, \alpha, r)\, r^2 dr = 3\sqrt{\frac{6}{\pi}} \cdot \frac{1}{l_\alpha^3 n^{3/2}} \cdot e^{-\frac{3r^2}{2nl_\alpha^2}} \cdot r^2\, dr \quad (2)$$

$$l_\alpha^2 = l_0^2 \frac{1 + \cos\alpha}{1 - \cos\alpha}$$

This equation shows that there exists a most probable

distance between the chain ends: namely, the r by which the function, W, reaches its maximum value. This r is given by

$$\lambda = l_0 \sqrt{2/3} \cdot \sqrt{n} \qquad (3)$$

and is proportional to the square root of the chain links, as one would expect on the basis of the statistical character of the whole calculation.

All these considerations lead to the assumption that a chain which is in thermodynamical equilibrium with its surrounding matter will always tend to get into the condition that has the greatest number of possible realizations. This means nothing else but that the Maxwell-Boltzmann statistics have been applied to one single macromolecule, and serious objections will not be raised as long as the number of independent elements for a statistical treatment is sufficiently large.

With this limitation we ascribe to an isolated main valence chain and entropy, s, and calculate this entropy by the Boltzmann equation

$$s = k \ln W \qquad (4)$$

W is taken from equation (2).

First we find that such a chain will by itself always tend toward the state of greatest entropy, i.e., greatest probability. In order to obtain a state of smaller entropy, work must be put into the system. If we have a chain with the distance, r, between the end groups and want to stretch it to its maximum length $r_{max} = L$, we have to put in an amount of work, A, which is equal to the difference of the entropy between the two states:

$$A = S_r - S_L = k\left[\ln W(r) - \ln W(L)\right] \qquad (5)$$

During an adiabatic extension an equivalent amount of heat Q

$$Q = A$$

is produced. This is absolutely identical to the heat developed in an ideal gas during adiabatic compression. Here a loss of entropy is obtained because certain parts of the volume, which formerly were at the disposal of the gas molecules, are now blocked off and therefore not available. As a consequence, the number of possibilities to be realized and hence the probability and the entropy must decrease.

The pressure, p, of an ideal gas is due to the irregular motion of the molecules, which tends to cause the volume of the gas and the number of "complexities" to increase. In the same way the tension, σ, at the ends of a stretched main valence chain, is caused by the irregular thermal movement of its different parts. This tends to shorten the chain, because the shorter state has a greater number of possible realizations and hence a higher entropy value. From the formulas:

$$p = + \left(\frac{\partial s}{\partial v}\right)_T \cdot T \qquad (6)$$

$$\sigma = - \left(\frac{\partial s}{\partial \Delta l}\right)_T \cdot T \qquad (7)$$

Δl = change of length

it can now be understood why rubber-like substances show a rise in temperature during stretching and cool during relaxation, in absolute analogy to the behavior of ideal gases and in entire contradiction to normal crystal elasticity.

In analogy to an ideal gas, an attempt will now be made to establish an equation of state for the ideal rubber, start-

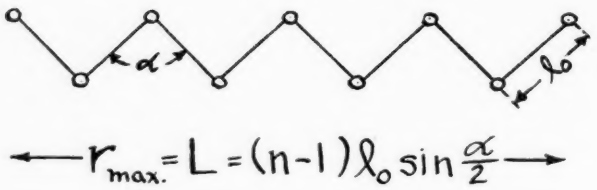


Fig. 2. Extended Form of a Hydrocarbon Chain

ing with equation (7). If according to (4) k ln W is substituted for s in equation (7) and W is taken from equation (2) the following is obtained:

$$\sigma = 3\ kT \cdot \frac{1}{n l_\alpha^2} \cdot \Delta l \qquad (8)$$

Δl = elongation of a single chain
σ = stress

This is arrived at in the same way as the following relation for one mole of an ideal gas:

$$p = \frac{RT}{V}$$

Therefore it seems justifiable to interpret equation (8) as the equation of state for ideal rubber. It combines the tension, σ, with the elongation, Δl, and represents the extension curve of a single main valence chain.

Experimentally, however, this curve is always measured by using a macroscopic piece of rubber, which has an original length, l, and reaches a certain elongation, Δl, under the influence of the stress. Therefore it is necescary to pass from equation (8), which relates to a single chain molecule, to another equation which holds for a macroscopic piece of material. This was done by W. Kuhn[11] and H. Pelzer.[14]

A unit volume of rubber is considered, assuming that it contains Z chains. When the sample is placed under a certain macroscopic tension, Σ, it undergoes an elongation Δl. Now, as a first approximation Kuhn[11] made the assumption that the entropy of the macroscopic piece of rubber is given by the sum of the entropies of the single chain. With these assumptions we obtain:

$$\Sigma = Z \cdot \sigma = Z \cdot kT \cdot \frac{3}{n l_\alpha^2} \cdot \Delta l = Z \cdot k' \cdot T \cdot \Delta l = E\,\Delta l \qquad (9)$$

T = absolute temperature

From (9) it can be seen that the macroscopic modulus of elasticity, E, of rubber-like substances is proportional to the absolute temperature. This fact has been verified by the experiments of K. H. Meyer, L. S. Ornstein, and their collaborators[4, 13] carried out in the first part of the elongation curve. The equation (9) further shows that there is proportionality between the tension, Σ, and the elongation, Δl, a fact which also stands in fair agreement with many experimental investigations of the first part of the elongation curve of rubber with a low degree of vulcanization.

A further evaluation of the relation shown in equation (9) was given by Kuhn.[11] The number of chains in the unit volume is closely associated with the average molecular weight of a single chain. It is found that

$$Z = \frac{\rho N}{M}$$

Z = number of chains
M = molecular weight of one chain
$N = 6.06 \cdot 10^{23}$
ρ = density

Therefore the modulus of elasticity can be used to de-

termine the molecular weight of the single chain. If one starts from the experimental values mentioned in Table 1 (10^5 to 10^6 dynes per sq. cm.), the molecular weight of the rubber chains is calculated to be between 20,000 and 100,000, which is in good agreement with other quantitative data for such substances.

The foregoing considerations show that by assuming that chains possess a certain degree of internal flexibility, a reasonable picture is provided for the first elementary process of the complete extension phenomenon. These considerations apply to the first part of the curve in Figure 1 and explain the following: (a) proportionality of E to the absolute temperature; (b) proportionality of E to the elongation; (c) production of heat during extension. Also a molecular weight of correct order of magnitude is obtained.

Doubt may arise as to whether the fundamental assumption: namely, the high amount of internal displacements in the sample during extension and contraction does not contradict our fundamental ideas of a solid body. But there is no reason for any contradiction whatsoever. It has long been known that each individual atom, ion, or molecule in a solid body is not at rest, but continually performs vibrations of high frequency. It is also known that, in many crystals, atom groups or even total molecules may rotate through an angle of 360° without affecting in the slightest the appearance and solidity of the solid sample. In many gels, which externally resemble an elastic solid body, vigorous Brownian movement of large particles can be directly observed with the ultramicroscope. It is, therefore, not surprising, but only natural, to assume that a considerable amount of microscopic internal displacement takes place when a sample of rubber is stretched to its tenfold length.

To obtain sufficient internal flexibility of the single chains it is not necessary to assume free rotation around the C-C axis. Recent investigations by Kistiakowsky and his collaborators[17] have shown that even an unsubstituted hydrocarbon chain has no free rotation at room temperature. But for our purpose it is only necessary that, after a certain number of links (say 8 or 10), a complete independence of subsequent links in respect to the first link is reached. This is certainly the case even if two directly adjacent members of the chain are not independent of each other.

Summarizing we may say: using statistical considerations and assuming a certain limited internal flexibility of the long chain molecules, a gaseous-like elasticity is obtained, which is described by the foregoing equations and seems to be the prominent mechanism during the first part of the extension curve.

An attempt has been made to illustrate the conditions prevailing during the extension of rubber in Figure 1. The curve starts linearly from the origin, and its slope represents a modulus of elasticity of about one to three kilograms per square centimeter, depending on the rubber used—latex sheet, unvulcanized smoked sheet, slightly vulcanized samples, or one of the synthetic products. Up to about 100% elongation the curve remains approximately a straight line, from which we may deduce that the pure gas-like elasticity prevails in this range. Its significant features are briefly summarized in Figure 1.

But this comparatively simple behavior does not last very long. As soon as a certain fraction of chains is sufficiently stretched, a crystallization process sets in, and the X-ray diagram indicates the appearance of a second phase. We enter herewith the range of composite elasticity.

(To be continued)

[17] G. B. Kistiakowsky, T. R. Lacher, and F. Stitt, *J. Chem. Phys.*, 7, 289 (1939).

Synthetic 190—A Polybutene of High Molecular Weight

SYNTHETIC 190, a rubber-like saturated hydrocarbon of high molecular weight, consists of essentially an improved type of polybutene, heat stabilized and containing 10% clay. The new material, introduced recently by Moore & Munger, 212 Park Ave., Plainfield, N. J., may be used to replace relatively large quantities of the rubber in stocks for a wide variety of products where improvement in certain properties is desirable. This material is mixed hot in a Banbury mixer with the rubber and compounding ingredients. As it is chemically saturated, it is not subject to vulcanization and for the same reason is not susceptible to oxidation.

Synthetic 190 is said to be superior to rubber in stability to oxidation, aging, and deterioration caused by metals injurious to rubber. According to its supplier, it has no taste or odor, retains its flexibility when cold, and possesses good electrical properties, simple processing properties, and compatibility with rubber. A white compound based on 40 parts of rubber and 60 parts of Synthetic 190 is reported to have shown no signs of discoloration or checking after 60 hours under an ultra-violet lamp; whereas a similar compound based entirely on rubber showed discoloration and checking after 18 hours under the same lamp.

With low water absorption, good dielectric properties, resistance to ozone, and super aging qualities, the new material is said to be especially suitable for insulated wire. It is recommended for white goods such as white sidewall tires and footwear where sun-checking and discoloration are a problem. Other claims for Synthetic 190 are that it will impart heat resistance and stability to sulphur as is desired in stocks for airbags and steam hose, that it will reduce permeability to air and gases and provide good aging when used in inner tubes.

New Zinc Sulphide Developed

SINCE zinc sulphide was first manufactured commercially in the United States by The New Jersey Zinc Co., 160 Front St., New York, N. Y., in 1924, several improvements have been made in the product which have given rise to the designations: Cryptone ZS-20, Cryptone ZS-86, and Cryptone ZS-230. The latest development is a technically pure grade, Cryptone ZS-800, which is finer than the preceding grades. In rubber compounds ZS-800 is similar to ZS-230 in whitening strength, reflectivity, stress-strain properties, and tear resistance, but it gives an appreciably better performance than ZS-230 in the DeMattia bend-flex test; also the water absorption of compounds containing ZS-800 is definitely lower than in the case of ZS-230.

The most outstanding effect of the properties of ZS-800 are shown in latex compounds, where it is said to have equal whitening properties, on an equal weight basis, to those of titanium dioxide. Also ZS-800 has better dispersing properties and does not tend to thicken latex or decrease its mechanical stability so much as ZS-230. The increased stability is probably due to the reduced water soluble content of the pigment.

In addition to its use as a whitening pigment, Cryptone ZS-800 is of interest in insulated wire compounds and for improving the adhesion of rubber to metal. In cold cured goods such as shoe quarter lining it is said to show good aging. Zinc sulphide also has the property of increasing the impact resistance of hard rubber.

Distributers' Tire Stocks in the United States, April 1, 1940[1]

THE results of the quarterly survey of retail stocks of automobile tires and inner tubes, as of April 1, 1940, are shown below in comparison with summary data for preceding quarterly surveys; the bases and methods described in earlier reports have been used in calculating the stocks held by the following three groups of distributers: 1. individual dealers, including large and small retailers; 2. distributers through oil-company chains; 3. manufacturer-owned-and-operated stores, mail-order houses, and other important retail chains.

Distributers' Stocks Indicated by Surveys

Total distributers' stocks of motor vehicle casings are estimated at 7,549,000 on April 1, 1940, an increase of 539,000 during the first quarter and 732,000 higher than for April 1, 1939. Higher figures are estimated for April 1 and July 1 in 1937, but not subsequently. Except for a slight decline in the third quarter of 1939, distributers' stocks have increased steadily since October, 1938.

The first quarter increase was greatest in the stocks of chain store distributers and the larger dealers; oil companies and small dealers show reduced stocks in comparison with January 1. Each group of distributers has larger stocks now than a year ago. A first quarter increase is seasonally normal, but the current increase of 539,000 exceeds that for the first quarter of 1939 (324,000) when consumer buying was definitely increasing. In 1938, stocks underwent a small anti-seasonal first quarter decline.

	Thousands of Casings			
1940	Dealers	Oil Companies	Other	Total
April 1	3,312	1,755	2,482	7,549
January 1	2,996	2,009	2,014	7,010
1939				
October 1	3,122	1,487	2,250	6,859
July 1	2,900	1,646	2,356	6,902
April 1	3,018	1,725	2,074	6,817
January 1	2,735	1,838	1,920	6,493
1938				
October 1	2,588	1,840	1,990	6,418
July 1	2,767	2,079	2,163	7,009
April 1	3,007	1,869	2,051	6,927
January 1	3,015	2,115	1,920	7,050
1937				
October 1	3,000	1,774	2,289	7,063
July 1	3,363	1,996	2,299	7,658
April 1	3,835	1,853	2,304	7,992
1936				
Estimated	3,500	1,650	2,000	7,150

	Thousands of Inner Tubes			
1940	Dealers	Oil Companies	Other	Total
April 1	3,551	1,481	1,821	6,853
January 1	3,310	1,671	1,532	6,513
1939				
October 1	3,220	1,406	1,793	6,419
July 1	3,206	1,393	1,829	6,428
April 1	3,460	1,626	1,588	6,674
January 1	3,445	1,733	1,599	6,777
1938				
October 1	3,132	1,781	1,727	6,640
July 1	3,560	1,805	1,786	7,151
April 1	4,021	1,918	1,728	7,667
January 1	3,547	2,127	1,717	7,391

The trend in stocks of inner tubes is the same as for casings, though less pronounced. During the first quarter dealers and chain stores have increased stocks, and oil companies have reduced them. The total of 6,853,000 tubes exceeds the figure for January 1 by 340,000, but is only 179,000 above April, 1939. Distributers are now holding 90.8 tubes for every 100 casings, against 97.9 a year ago and 110.6 two years ago.

Dealers' Reported Stocks

Stocks reported by 1,397 individual dealers for 2,043 stores in the current survey are compared below with the inventory of the same firms January 1, 1940. The small dealers show reduced stocks; those with 200 to 500 casings show a slight increase; the large dealers show considerably increased stocks of casings. The overall increase in stocks of both casings and inner tubes during the first quarter of 1939 is seasonally normal.

Number of Casings	Number of		January 1, 1940		April 1, 1940	
	Dealers	Stores	Casings	Tubes	Casings	Tubes
Under 200	921	1,032	80,782	112,879	76,599	113,052
200 - 500	282	355	83,669	95,956	84,150	91,430
Over 500	194	656	247,907	250,780	295,091	277,587
	1,397	2,043	412,358	459,615	455,840	482,069
Other April	435	741			183,584	203,501
Total April	1,832	2,784			639,424	685,570
Index numbers			85.6	94.6	94.6	101.4

The overall trend toward increased stocks of casings indicated by total comparable reports was identical for 212 dealers identified with one manufacturer, 183 dealers handling a second make, 65 dealers of a third manufacturer, and 937 dealers not identified by make of tire. This fact strengthens the conclusion that the statistics accurately portray the general industry trend during the period.

Stocks of New York Dealers

Stocks reported by 115 New York dealers with 187 stores in the current survey amount to 32,571 casings and 39,255 inner tubes, against 25,415 casings and 30,661 tubes reported by 119 dealers on January 1. These figures are included in the preceding paragraph. The New York dealers who reported both in January and April show the same trend toward increased stocks of casings which has already been mentioned; reduced stocks of inner tubes were, however, indicated by the comparative returns from New York dealers.

Oil Company Distributers' Reported Stocks

Reports were received in both April and January from 29 firms in this group. Some reports covered stocks in central warehouses only; while others also covered stocks in about 15,000 retail outlets. About 5% of the reported stocks were stated to be consigned stocks, owned by manufacturers who presumably also included them in their reports of inventory to The Rubber Manufacturers Association, Inc. During the first quarter of 1940 the total tire stocks held by oil companies declined as indicated by in-

(*Continued on page 52*)

[1] Supplement to *Rubber News Letter*, Apr. 28, 1940. Prepared by Leather & Rubber Division, U. S. Department of Commerce, Washington, D. C.

"Vinylite" Series V Resins

Plasticized Copolymers of Vinyl Chloride and Acetate[1]

J. R. Price[2]

THERE are four series of "Vinylite" resins: series A resins are polyvinyl acetate; series Q are polyvinyl chloride; series V are copolymerized vinyl chloride and vinyl acetate; and series X are polyvinyl butyral. Series A resins are used principally as thermo-sealing adhesives; while series X find application primarily as the interlayer for safety glass. Series Q have rubber-like properties when properly plasticized. The copolymer series V cover a wide range of properties and applications, and certain of these resins, when properly plasticized, have rubber-like characteristics in addition to other properties not exhibited by natural rubber. Yet they are in no sense synthetic rubbers. The properties and uses of these rubber-like plasticized series V resins will be discussed in the present article.

"Vinylite" plasticized series V resins are entirely new materials, not yet fully exploited, and while handled by much the same equipment as is used for compounding and fabricating rubber, they do not tend toward the replacement of rubber, but chiefly to open many new fields of uses. They can be used in a large number of applications in addition to those in which rubber-like materials now play an important part. In processing, these materials can be milled, calendered, or extruded, and they can be sealed to themselves or to other materials including textiles, paper, pulp-board, or rubber by several methods such as sewing, metal stitching, heat sealing, and by the use of adhesives. Once fabricated, the material retains its complete permanence of form, its resistance to oils and chemicals, its non-oxidizing properties, and its elasticity. The color possibilities, the transparency, and the chemical inertness obtainable with "Vinylite" resins combine to give the rubber manufacturer a more complete line of profitable products.

Household Smock of Natural-Finish Clear Material

Chemical Nature

These resins, before plasticization, are white powders which are essentially low-cost products, derived from domestic raw materials of practically unlimited availability—natural gas and salt. The powdered resin, which is thermoplastic, is compounded with the proper plasticizers, stabilizers, lubricants, and dyes in a heated Banbury mixer, and then the plasticized material is sheeted, extruded, or molded into whatever shape is desired—just like rubber, except that no curing is required.

In the copolymerization of vinyl chloride and vinyl acetate, both materials become chemically united, with the prevalence of certain groups depending upon the initial concentration of chloride and acetate. It is possible to vary widely the properties of the copolymer by control over the degree of copolymerization and the ratio of chloride to acetate. A ratio of 87 chloride to 13 acetate has been the basis for a product of wide application.

Characteristics of Finished Plastic

In the finished form the plastic is tough, elastic, inert to weathering and to the action of many chemicals, and can be transparent or opaque in any color including pastel transparents. These resins are not naturally rubber-like, but attain these properties only by the incorporation of a plasticizer. The material can be made to have an elongation of 300% with a tensile strength of 3,000 pounds per square inch or more, depending upon the plasticizer and the amount used.

At ordinary temperatures the plasticized material will return to its original shape after any distortion up to the breaking point. When distorted, however, it does not snap back to its original shape as does live rubber. Its recovery from either elongation or indentation is slow. When slightly distorted, it recovers in a second or so. More severe distortion may require several seconds before recovery, and if it is stretched to a point just below its elastic limit, it may not recover its original size for several minutes. But eventually it always comes back.

Because the material is made from a resin of high molecular weight, it is very tough and will withstand severe impact—almost as much as the new high-test safety glass interlayer of polyvinyl butyral sheet. Articles made from the plasticized copolymer stock will withstand an indefinite number of flexings over a wide temperature range without cracking or showing any signs of weakening. In addition they are non-oxidizing, which means

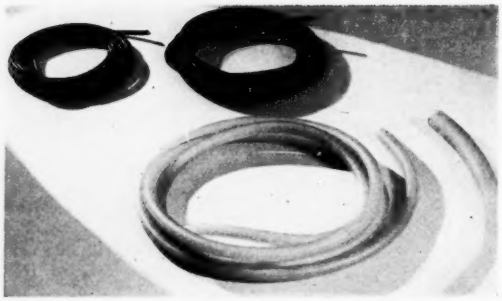
[1] Presented before the Boston Group, Rubber Division, A. C. S., Apr. 5, 1940.

[2] Carbide & Carbon Chemicals Corp., 30 E. 42nd St., New York, N. Y.

Umbrella of Natural-Finish Clear Material

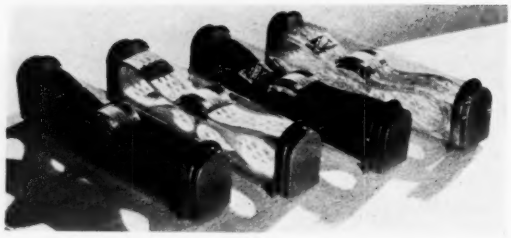
Colored Transparent Raincoat

Protective Corrosion-Resistant Tape Used at Present for Wrapping Electro-Plating Racks and Automobile Ignition Harnesses



Extruded Tubing Utilized in Breweries and Corrosive Fluid Applications

that they are permanent in both form and appearance. Sufficient time has not elapsed for us to be able to say that the material will not change over a period of years, but the stock which has been employed shows no signs of any aging effect. It may be that there will be a slow loss of plasticizer from the surface over a period of years, but it is doubtful, in the applications for which the material is now being used, whether this condition will ever make any difference whatsoever.



Men's Belts, in Colors and Transparent, in Packages Formed from Unplasticized, Rigid "Vinylite" Resin Sheets

Chemical Resistance

Several important applications have already developed for the material because of its extreme chemical resistance. Applications wherein the stock is in direct contact with chemicals, however, require some attention to the choice of plasticizers. The unplasticized, high-molecular weight resin will withstand inorganic acids and alkalies and most organic compounds without being affected. Certain ketones, chlorinated compounds, a few aromatic hydrocarbons, and other solvents slightly soften the high-molecular weight resin, but it is resistant even to nitric acid, hydrofluoric acid, and strong alkalies. When plasticizers are incorporated in the mix, the situation may arise where the plasticizer itself is not resistant to the chemical which will be in contact with the resin product. Of the wide variety of plasticizers available one or more of them will usually be sufficiently resistant for specific problems.

Compounding and Fabricating

These types of "Vinylite" resins have a limited thermal life. The temperature range in which they can be handled is more critical than with rubber compounds, and it must be controlled more accurately throughout the compounding and fabricating processes as the characteristics and the quality of the formed product as well as its ease of fabrication are thus influenced.

The actual compounding is done by first blending all of the dry ingredients and preferably the lubricant and plasticizer without heat before charging to the Banbury mixer. This assures that all of the resin comes in contact with the stabilizer before it is fluxed or heated. The operation is then started in a chromium-plated Banbury using approximately 50 pounds per square inch steam pressure in the rotors and jacket until the mix starts to flux. The steam is then turned off, while mixing is continued, until the batch reaches 170-180° C., when it is dumped.

This material is worked on a two-roll differential speed mill, usually with from four to six passes, using a 20-pound per square inch steam pressure on the rolls. Overheating must be avoided. Mechanical working of large masses generates considerable internal heat which, if excessive, may bring about undesirable physical and chemical changes in the resin. Even moderate overheating causes a certain loss of plasticity with consequent difficulty in fabricating. Further overheating may cause decomposition with liberation of traces of hydrochloric acid gas. For the same reason care must be exercised to avoid storing the stock hot for long periods of time. For instance, when it is brought out of the mixer, it should be put directly on the mill, and, if the capacity of the mill is too small, it may be necessary to remove a part of the stock in sheets and allow it to cool.

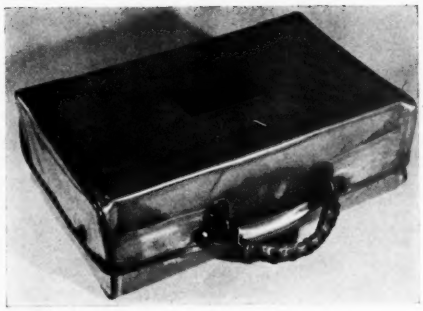
The same precautions are necessary when transferring the material from the mill to the calender or extruder. Calendering is done with heated rolls with the stock at a temperature of 120 to 130° C. The sheeted stock can be cooled either in air or by immersion in water. For extrusion, however, several practices must be modified somewhat from the usual rubber-extrusion practice. Single-lead screws which inherently develop higher pressures are, in general, preferable to the double-lead type. The screw, except for the land area in contact with the cylinder wall, should be chromium plated and the cylinder wall should have a liner of stainless steel or preferably "Hastelloy" alloy B. All internal contours of the extrusion machine should be thoroughly streamlined to eliminate dead spots or areas where the resin mass might lay dormant, and all other steel surfaces in the resin path, including the die itself, should be chromium plated.

The common practice of operating tubing machines with a bleeder opening so that part of the delivery bypasses the die and returns to the feed end of the machine is objectionable with "Vinylite" resin. It exposes the plastic to excessive heat punishment and at the extrusion die lowers and unbalances the available pressure, which is none too great anyway. It is highly desirable to balance the input to the output required, by adjustment of the size of the strip fed to the tuber, and not to use a by-pass mechanism.

As uniformity of feed to the tuber and temperature of the mass are most important, the preferred procedure is to remove a strip continuously from the mill by cutting knives and to convey it to the tubing machine through a heated chamber, thereby delivering the resin to the tuber in a suitable condition for immediate pick-up by the screw. In some instances, though, it has been found that the stock may be fed to the extruder cold with satisfactory results.

In general the effective die length should be greater than with rubber. This feature has not been clearly established for all diameters of rods or tubes, but it has been shown that surface finish is improved and that the expansion, or increase in extruded diameter over the die orifice size, is markedly diminished at any given extrusion rate by longer dies. In general it appears that a die length at least 2½ times the diameter is desirable and that a factor of 4 is preferable. Improvements in surface finish and lowered expansion are, however, noticeable up to die lengths of nine times the diameter, although these data are predicated on diameters around ¼-inch and the comparatively low extrusion rates of approximately 50 feet per minute.

Usually, the conditions for extrusion should be approximately as follows: stock feed temperatures of 150 to 160° C.; screw, cylinder and head temperature of approximately 110° C., obtained by a 15-pound per square inch steam pressure; die holder temperature of approximately 150 to 160° C., maintained by a 60-pound per square inch steam pressure; screw speed of 45 to 50 r.p.m. To obtain a finish with a high gloss the die holder may be heated to 205° C. without impairing the quality of the product. Uniformity of temperature on the die holder and die proper is particularly important, and the conventional scheme of heating the die and holder by gas is generally inadequate.



Leather Traveling Case Enclosed in "Vinylite" Resin Sheeting

Men's Sport Shoes with Uppers Made from "Vinylite" Resin Sheet in Contrasting Colors and Degrees of Transparency

At present a good share of the "Vinylite" series V plasticized resin material has been made as sheet having a thickness from 0.004-inch up to 0.085-inch. Considerable wire has been coated by extrusion, and we have also extruded film-thickness tubing and even flexible solid lengths for shoelaces. Not much has been done on injection or compression molding of the plasticized resin as yet, simply because there has not yet been a demand for such articles. But there is reason to believe that this may become an important outlet for the material.

Uses for Sheet Material

The sheet, as it comes from the calender, contains a few striations from air bubbles that have been elongated. This gives it a texture which has purposely been left in for many uses. If desirable, the sheeting can be press polished to a high gloss, so high that the transparent colorless sheets look like flexible glass. Press polishing is accomplished between polished heated platens of a hydraulic press.

Unpolished, calendered sheets were first used for belts, suspenders, and garters. The sheeting is cut to shape and fastened to itself by an adhesive or by stitching, or heat sealing. These three haberdashery items were originally put on the market for the 1939 Christmas season. They were very successful and are now carried by leading men's stores. Since these were first put on the market, more and more fabricators have entered the field, and soon ladies' belts of a wide variety of attractive designs and colors will be produced.

These articles have several unique sales features. By stretching, they yield to body movements and return to shape slowly, so are very comfortable to wear. When transparent, the material matches every shade or pattern. On the colored accessories the dyes used are fast and permanent. An additional advantage is that the material is new and different from anything previously made.

The many other uses of this material include high-quality men's sport shoes and bedroom or beach slippers, which are easy to clean, waterproof, resistant to creasing or cracking, and comfortable. In most of the shoes the uppers have been of "Vinylite" plasticized resin sheeting in one color or in contrasting colors, but in some instances this new sheet has been combined with leather and other types of shoe fabrics. The high-gloss side of the calendered sheeting gives the appearance of patent leather.

Raincoats, recently made from thin films, have proved to be not only completely waterproof—there is no need of even a seam through which water might leak—but they are wrinkle-proof and will not become tacky. They readily withstand direct exposure to sunlight and are tough, serviceable, and easy to fabricate. The clear film with the natural calender finish has an attractive silky sheen. When press polished to remove surface irregularities, the film becomes clear and presents a highly polished surface.

Many other possible applications of sheeted material are being investigated. Watch straps of attractive designs are in production, and one company is making dog collars and leashes. It is useful for umbrellas, cosmetic bags, luggage coverings, sanitary belts, garment bags, upholstery covering, handbags, tobacco pouches, brief cases, and elastic tops for jars. One fabricator has estimated he can make about 250 products from the sheet or film. It can also be calendered on to cloth to make beauty parlor hoods, shower curtains, etc.

Applications of Extruded Shapes

Articles extruded from this plastic material have the same characteristics as do the sheeted products. Shoe laces are being made in all colors, and it is interesting to note that the transparent ones, which are completely flexible, will "pipe" light just as other clear plastic and quartz rods do. Thin round thread is used for stitching tobacco pouches and handbags.

As tubing for administering anaesthetics in hospitals, it is completely resistant to the chemical effect of ether and other organic chemical anaesthetics. Because of its oil resistance, this material has been used as the inner

(*Continued on page 52*)

Latex Improves Biological Specimens

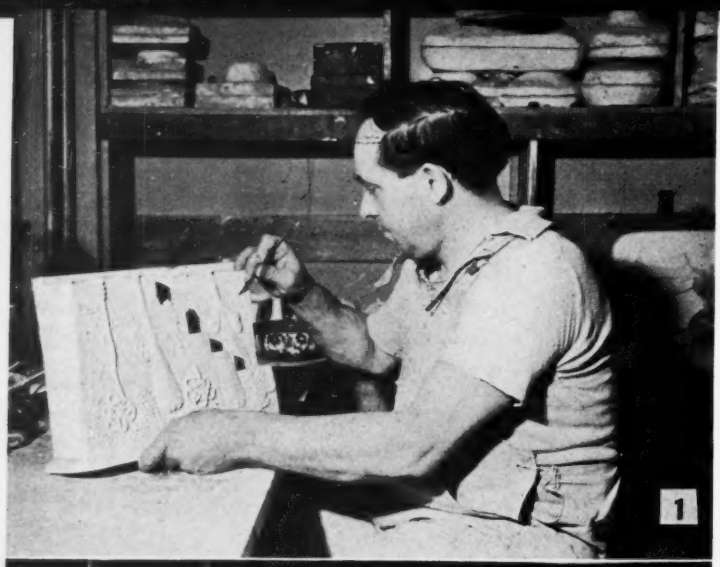
DURING recent years increased knowledge regarding latex usage has led to a number of interesting applications of this material, economically or technically unfeasible with crude rubber. Two striking applications in which latex is substituted for other materials have recently been developed for the preparation of biological models and for injecting the circulatory system of biological specimens. In both instances the tough and resilient nature of the rubber has markedly improved the products.

Biological Models

For many years biological and anatomical models, used in colleges, high schools, and medical schools, have been made of plaster of Paris or of papier-mâché. These models, although suitable in appearance, were subject to easy breakage and chipping. In a search for a material that would resist breakage to replace plaster, latex compounds were tried and found successful.

In the production of these models the first necessary step is to make the original form, which is done in modeling clay by an experienced sculptor. A mold is then made by covering the clay original with plaster of Paris. Any object which it is desired to reproduce can be used as an original form by applying plaster of Paris directly to its surface, using a suitable separating fluid such as soap. Oftentimes the mold must be divided into parts to provide for any undercuts present. The mold is permitted to dry thoroughly and is then ready for the casting operation.

In order to obtain the desired rigidity in the finished model, the latex is mixed with fillers. Other necessary



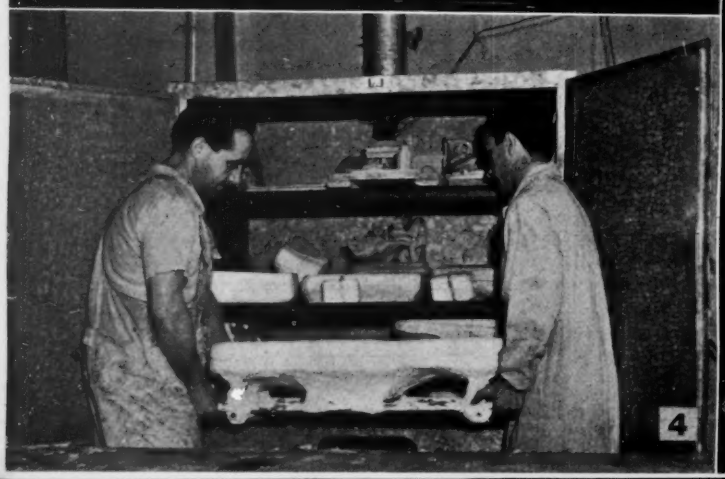


Fig. 1. Sculptor Tooling Plaster of Paris Original for Model of Section of Human Skin

Fig. 2. Pouring Latex Compound into Mold for Open-Back Model of Human Digestive System

Fig. 3. Pouring Latex into Multi-Section Mold for Human Ear Model

Fig. 4. Placing Mold into Oven after Latex Has Been Deposited and Excess Poured off

Fig. 5. Removing Digestive System Model from Mold (Note Internal Mold Sections for Undercuts at Left and in Operator's Hand)

...ic Models and Injected

J. Rubinger[1]

compounding materials—stabilizers, dispersing agents, and vulcanizing ingredients—are added. An excess of the latex compound, which is fairly viscous, is poured into the mold and allowed to stand for a sufficient time, usually about one-half to one hour, permitting the cast to be built up to the desired thickness as the result of absorption of the water by the plaster. After the required amount of rubber has been deposited, the excess is poured off, and the mold placed in an oven for 1½ to two hours at 50° C. for setting of the latex to proceed. When the latex is sufficiently firm, the model is removed from the mold.

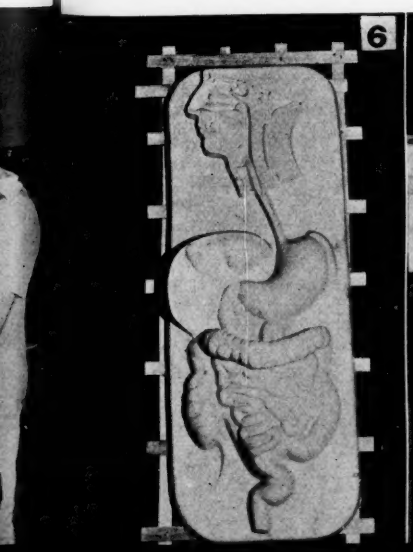
Great care must be exercised in removing the latex model from the mold in order to prevent injury in this semi-dry state. Open-back models are supported with cotton waste and then placed on wooden lattice frames. The model is then returned to the oven for final drying and vulcanizing.

When thoroughly dried and cured, the flash formed at the mold section divisions is removed by sanding and buffing. Ready now for coloring, the model is first sprayed with a base coating of paint. A skilled artist then applies, by brush, contrasting colors to specific structures of the model including the finer details. The finished model, while identical in appearance with the plaster model, will not chip or break and will stand considerable rough usage on the part of students in the classroom or laboratory.

Injected Specimens

In the study of biology, preserved specimens of animals are required for dissection purposes. To aid students in tracing the course of the circulatory system through the body and in distinguishing between veins and arteries, it

[1] In charge of latex products, New York Scientific Supply Co., 113 E. 22nd St., New York, N. Y.



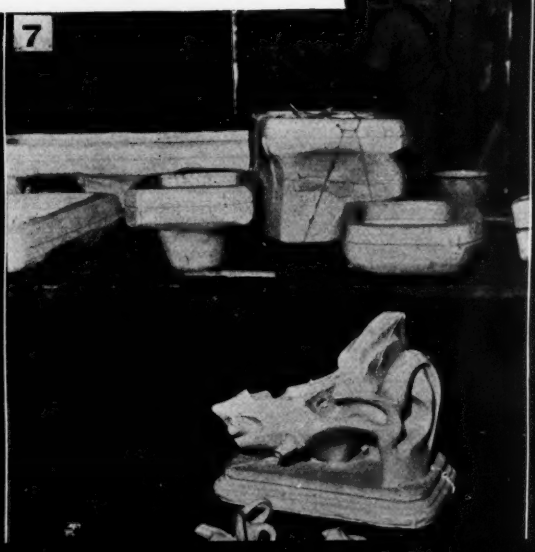


Fig. 6. Cast of Human Digestive System
Fig. 7. Cast of human Ear with Internal Ear Parts in Foreground
Fig. 8. Spray Painting a Flower Model
Fig. 9. Painting Details on Human Ear Models
Fig. 10. Display Case of Finished Models
Fig. 11. Injecting Colored Latex into Circulatory System of Foetal Pig

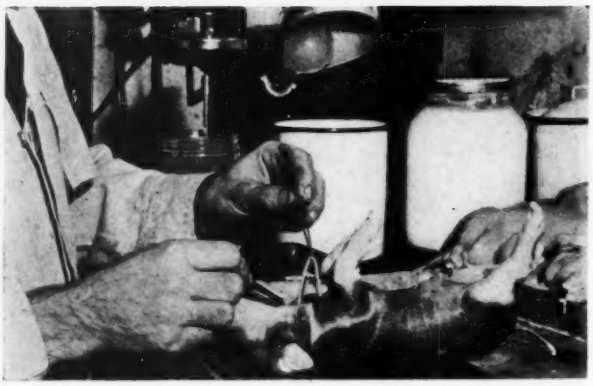


Fig. 12. Demonstrating the Elasticity and Toughness of a Latex-injected Artery of Foetal Pig Specimen

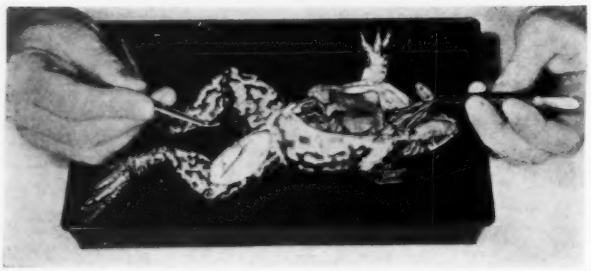


Fig. 13. Latex-injected Frog Specimen

has been the practice to inject colored starch suspensions (usually red for arteries and blue for veins) into the blood vessels of the specimens. One disadvantage of using a starch mass is that loss of continuity of the blood vessel often results if the vessel is accidently ruptured or cut (a likely occurrence in the hands of the inexperienced student). Also, a starch mass does not penetrate so well into the finer blood vessels.

These defects are to a large extent overcome by the use of a rubber latex injection mass. Fluid latex colored with red or blue dyes is injected into the circulatory system of the specimen with a syringe in the same manner as the starch mass is handled. The injected specimen is then preserved in formaldehyde. Specimens so treated include, among others, fish, lobsters, frogs, turtles, pigeons, cats, rabbits, foetal pigs, rats, and monkeys. The student is now able to trace much more easily and efficiently the circulatory system of an animal. The tough and flexible nature of the latex injection and the added penetration obtained have proved to be valuable aids in the biological laboratory.

"Vinylite"

(*Continued from page* 49)

liner of pneumatic hose. Pipes for handling fermented beverages have been proved through service experience to be flexible, durable, and without effect on the flavor of the beverage.

Electrical Uses

In the electrical industry both sheeted and extruded shapes are used. As an insulator, the plasticized material, properly compounded, possesses electrical properties equivalent to rubber at room temperature and has been incorporated in several different types of extruded wire coatings, cable coatings, and in the form of tape for automobile ignition system harnesses. Insulation coatings are being extruded at high speed on to automobile, telephone, and telegraph wire. Its availability in a number of colors makes identification of the wires easy, and the single layer of insulation can be removed readily when making connections. Because of the toughness of this type of insulation, it is unnecessary to use braided fabrics for protection.

Film, cut into tape and wound spirally around electrical cables as insulation immune to water, oils, and corrosive chemicals, is particularly applicable on shipboard and in chemical plants and oil refineries. Because the tapes are easily heat-sealed along the overlapped joints after winding has been completed, they form an impervious, continuous protective coating which is also non-inflammable.

In several of the new cars the ignition cable harnesses, which consist of all wires in the electrical system—from generator to battery, and to horns, headlights, taillights, lighters, radios, switches, heaters, and so on—are bound together by wrapping them with "Vinylite" plasticized resin tape. These were formerly braided and then lacquered. The Halowax Corp., a division of Carbide & Carbon Chemicals Corp., has developed machines for wrapping the plasticized resin tape around the wires. Through the use of this material the cost of the electrical wiring system has been reduced very markedly.

Tire Stocks

(*Continued from page* 46)

dex numbers below, although nine of the 29 comparative reports showed stocks somewhat increased.

OIL COMPANY REPORTED STOCKS

	January 1	April 1
Number of firms	38	31
Casings	1,102,731	905,350
Tubes	922,488	764,130
Index Numbers		
Casings	121.25	106.3
Tubes	101.3	89.8

Other Mass Distributers' Stocks

Reports were received from six tire manufacturers operating 2,079 (January, 2,089) retail stores and covering stocks held in those outlets, and from eight other mass distributers operating 2,041 (January revised, 2,029) stores (and/or doing mail-order business) and covering their total stocks as of April 1. The manufacturers' stores were holding 1,062,083 casings, or 85,000 increase over January 1, but their stocks of tubes (787,149) declined negligibly. The other firms reported sharply increased aggregate stocks of both casings and tubes. Stocks reported here by manufacturers are presumably also included in manufacturers' inventory as reported by the R. M. A.

REPORTED COMPARATIVE DATA

	January 1	April 1
Number of firms	14	14
Number of stores	4,118	4,120
Casings	2,013,856	2,482,417
Tubes	1,532,408	1,821,166

There is understood to be another company in this group, not included above, but the reported figures have been treated as complete in accordance with past practice,

(*Concluded on page* 57)

Report of the Crude Rubber Committee, Division of Rubber Chemistry, A. C. S.[1]

In addition to a comprehensive review of the activities of the Crude Rubber Committee during the five years of its existence, and a brief description of the problems now under consideration, this report presents some data on the rate of cure of No. 1 Ribbed Smoked Sheets and a practical method for determining the approximate quantity of foreign material in a 1000-pound sample of crude rubber based on a factory process of washing rubber. Because of the wide interest in the contamination in rubber and the desire expressed by the Committee for comment and suggestions from members of the industry, this complete report is published below with the approval of the Crude Rubber Committee and the Division of Rubber Chemistry.

EDITOR'S NOTE.

THIS meeting of the Division of Rubber Chemistry marks the fifth anniversary of the establishment of the Crude Rubber Committee. The Committee wishes to express its thanks to the Chairman of the Division of Rubber Chemistry and to those members of the Division who have cooperated with it in any way. The Committee also wishes publicly to acknowledge and express its appreciation of the very excellent leadership given the Committee by its past chairmen.

The Crude Rubber Committee this year has an enlarged membership, there being seven regular members; whereas formerly there were five, and each regular member has an alternate who is familiar with the work and problems under investigation by the Committee. This increase in membership was effected in order to cover more completely all fields of rubber technology and to insure that each member could be represented by a fully qualified alternate at any of the meetings of the Committee.

Since this is the fifth anniversary of the Committee, it may be in order to review very briefly the work of the Committee before proceeding to a consideration of the problems now under investigation.

The Committee is very much pleased that the standard recipe for testing the rate of cure of crude rubber has been so well received and so widely adopted, particularly by technical organizations closely connected with crude rubber production.

Standard methods of analysis of crude rubber for copper and manganese have been published by the Committee. Both materials have long been considered deleterious to rubber, and yet up to now there has been no generally accepted method for determining the extent of their presence in crude rubber.

Procedures for the testing of latex have been published in the Analytical Edition of *Industrial and Engineering Chemistry*[2] and in *Rubber Chemistry and Technology*.[3] The procedures do not cover all types of latex testing, and additions to these will be made from time to time.

The subject of testing the plasticity of crude rubber has been under consideration for a long time, and much work has been done. As yet the Committee has not reached an agreement regarding any procedure for testing this property which would allow it to be proposed as a standard method.

The Committee has also given considerable attention to the development of a recipe and test to determine the age resistance of crude rubber, and to the problem of determining the amount of dirt or foreign matter in crude rubber.

Exchange of opinions and correspondence with rubber technologists, representing producers of crude rubber as well as manufacturers, has also been a matter of major importance. To accomplish results of lasting value we in this country must keep in mind the needs of other users, and we must also have regard for the problems of the producer. It is in this field that the Crude Rubber Committee can justify its existence as much as in any other.

The present activities are a continuation of the past. The Committee meets at irregular intervals to discuss the progress of study of problems under consideration and to decide on future work.

The Committee met in Akron on January 22, 1940. This was the first meeting of the enlarged committee and was attended by all the members and several of the alternates. The following items were under consideration, and the report on them is given below.

1. Plasticity

A number of the details of a test procedure were agreed upon, but the Committee felt that several points should be investigated further before publishing a tentative procedure. Publication of this procedure may be expected in the near future.

2. Latex Testing

A test for mechanical stability of latex was discussed. This test is being studied in several laboratories, and it was decided to await the results of these studies before offering a procedure to the Division. The Committee has placed this important subject on the agenda for its next meeting and hopes to make a report on it at the next meeting of the Division.

Tentative procedures for testing latex have been published, and the Committee purchased a number of reprints and distributed them to various technologists, both in this country and abroad. Any member of the Division who requires a copy of these procedures, which may be found in *Rubber Chemistry and Technology*[3] or in *Industrial and Engineering Chemistry*, Analytical Edition,[2] [or in INDIA RUBBER WORLD], should write to the Chairman of the Crude Rubber Committee.

The Committee has found that there were three errors in these tentative procedures as published.

Referring to page 595 in *Industrial and Engineering Chemistry* or page 142 in *Rubber and Technology*,[4] equation (3b), under the subheading "Determining pH—L-6," should read

$$E_0 = E_1 - \frac{pH_1 (E_1 - E_2)}{pH_1 - pH_2}$$

[1] Presented before the Division of Rubber Chemistry at the semi-annual meeting of the American Chemical Society, Apr. 11, 1940.
[2] II, 593-97 (1939). Reprinted in INDIA RUBBER WORLD, Jan. 1, 1940, pp. 47-49, and Feb. 1, pp. 51-53.
[3] Jan., 1940, pp. 136-48.
[4] Also INDIA RUBBER WORLD, Jan. 1, 1940, p. 49.

Referring to page 597 in *Industrial and Engineering Chemistry* or page 146 in *Rubber Chemistry and Technology*,[5] under the subheading "Determining Viscosity and Yield Point—L-7," equation (1) should read.

$$K_1 = \frac{\pi R^4 g d(h_1 - h_2) \times 100}{8 LV}$$

Referring to page 597 in *Industrial and Engineering Chemistry* or page 147 in *Rubber Chemistry and Technology*,[5] under the subheading "Determining Water Solubles, L-11," the following corrections should be made in the first paragraph under "Details."

The third sentence should read, "Transfer to a 200 cc. volumetric phosphoric acid flask (this type of flask has a wide neck and is easily cleaned), and make up to within about 20 cc. of the mark."

The next sentence calls for 1 *N* sulphuric acid. This should be 0.1 *N* sulphuric acid.

3. Packaging

Carefully produced crude rubber cannot reach the consumer without contamination by foreign material unless it is enclosed in a suitable package which prevents the entrance of dirt. A tightly pressed bale, wrapped in treated hessian fabric, has been generally agreed as a more satisfactory package from this standpoint than the Venesta cases used, but these bales have some serious disadvantages.

A method of packing smoked sheets in a rubber wrapper appears to be a distinct improvement, and the Committee would like to have all members read the description of this type of package as given by Don E. Andrews in a recent issue of India Rubber World.[6] The package there described has considerable merit and deserves serious consideration.

The present shortage of wooden cases may force the more general use of the bale as a standard package, and it would be advantageous to the crude rubber consumer to have the better grades packed in a container which would more satisfactorily keep the rubber as clean as it was when it left the plantation.

4. Sampling

All tests of rubber properties such as rate of cure, plasticity, age resistance, and presence of deleterious materials require the use of single small samples. Crude rubber is not adapted to easy drawing of samples; consequently great care must be exercised in order to get a truly representative quantity on which to base judgment of the entire lot under examination. No standard procedure for sampling rubber for analysis of its technical properties has been proposed. The Committee now has this subject under careful consideration and will welcome suggestions or ideas from any members of the Division of Rubber Chemistry who may have done work along these lines.

5. Age Resistance

The Committee reported at the spring meeting in 1937 that the initial investigation of the subject of age resistance had resulted in a mass of conflicting data. The subject has been reopened and is now receiving further attention from the Committee.

The Committee is trying first to find whether a practical compound, tested by an accepted standard age resistance test, will show that crude rubber, free from deleterious substances, will show variations in its resistance to the test. The test will also have to reflect the presence of deleterious substances. At present, the Committee has no definite information as to whether rubber varies in this way and will welcome any information along this line from anyone who has had experience with such rubber.

6. Rate of Cure

Since publication of the standard recipe, we have had a number of inquiries from various sources as to what would be considered a good rate of cure for rubber.

The Committee was established to bring together the ideas of the rubber technologists in the United States regarding crude rubber and to convey those ideas to technologists working on crude rubber in other countries. All mention of standards of quality and allowable limits of variation of any property have been deliberately and carefully omitted, as the Committee is empowered only to set up a test and not to apply it. The Committee does not wish anyone to consider it as a group for setting up market standards.

At the meeting of the Division of Rubber Chemistry held in April, 1939, the Crude Rubber Committee presented some standards which were proposed by the London Advisory Committee for Rubber Research. At that time the American Crude Rubber Committee expressed itself as being in agreement with the principle of setting standards for crude rubber, but for the reasons stated above, the American Committee could neither approve nor disapprove the standards and limits proposed.

Your Crude Rubber Committee has believed, however, that publication of data obtained from the use or application of any of its standard formulas or procedures would be of interest and possibly of value to technologists both in the United States and abroad, by showing the actual results obtainable from such procedures, and thereby would stimulate further interest in their use and application.

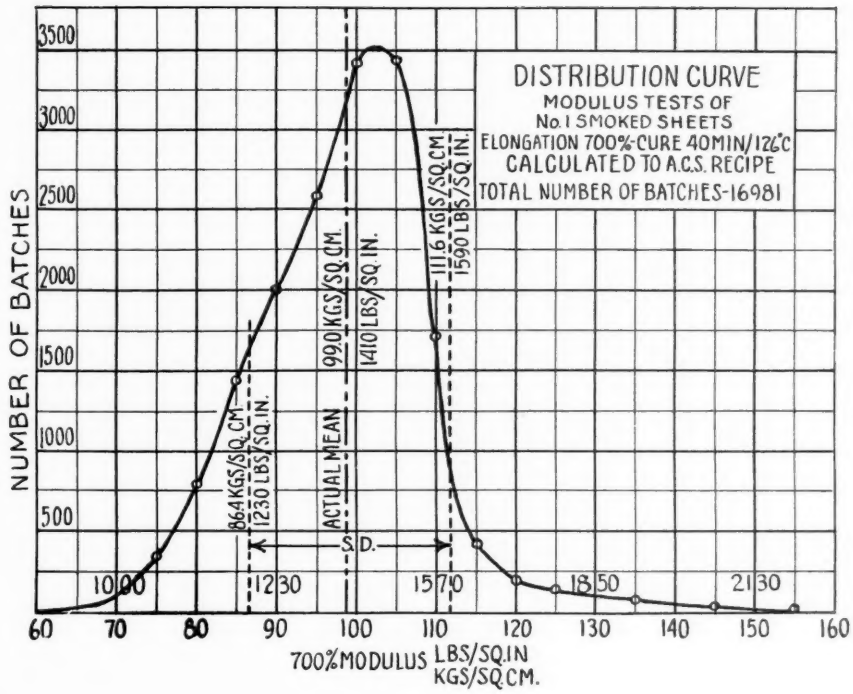
With this in mind the Committee considered the matter of publishing further information on the variability of rubber in respect to its rate of cure. In the report of the Committee given in April, 1936, data on the rate of cure of smoked sheets were given to show the extent to which rubber varied, as revealed by the standard recipe. The tests were, however, those of selected samples and might not represent the degree to which the regular run of production might vary. The Committee decided that information on this latter point would be of value.

In order to show more clearly the rubber variation, it was desirable to establish a single basis of comparison, as the introduction of a second basis or variable would complicate the picture to such an extent that confusion would result.

The rate of cure of rubber in the standard recipe can be judged by using definite properties at any of the specified cures. It is necesary, however, to set a single cure and a particular property of that cure if simplification of testing and accuracy of judgment are to result. After careful consideration, the 40-minute cure at 126° C. (260° F.) was selected as satisfactory. Shorter cures are apt to exaggerate variation, and longer cures repress it.

Up to now, the Committee has suggested that readings of the load at elongations at 500, 600, and 700% be taken and recorded as well as the ultimate break and elongation. The 500% modulus does not show a great amount of variation, as the load is always small. The 600% modulus is, however, fairly good and has an advantage over the

[5] Also India Rubber World, Feb. 1, 1940, p. 52.
[6] Mar. 1, 1940, pp. 33-37.



700% modulus in that the reading is slightly easier to make with a single observer. It does not, however, offer the sensitiveness of the 700% modulus. Ultimate tensile does not truly reflect the stiffness of the stock, and its value is seriously affected by a number of factors such as the machine used, the dimensions and shape of the test strip, and others, as shown in the literature.

Taking all things into consideration, the Committee suggests that, if the rate of cure is to be compared at a single cure and modulus, the 40-minute cure at 126° C. (260° F.) and the modulus of 700% be used. This suggestion is made without prejudice to any other standards now used and without claiming that such a single cure and modulus exactly reflect the behavior of the rubber at other cures and elongations. The Committee does believe that it is desirable to set such a single set of conditions and that reference to such conditions as standard would be advantageous.

A considerable volume of data, obtained in factory testing of smoked sheets, was made available to the Committee. The only point recorded in these tests was the 700% modulus at the 40-minute cure at 126° C. (260° F.). The results have been assembled in a distribution curve as shown in the accompanying graph.

The total number of tests involved was 16,981, and the actual average modulus at 700% elongation was 99.0 kgs. per sq. cm. (1410 lbs. per sq. in.). The average deviation (A.D.) was 10.0 kgs. per sq. cm. (142 lbs. per sq. in.). The standard deviation was 12.6 kgs. per sq. cm. (179 lbs. per sq. in.). According to statistical theory, the values within the range of the standard deviation comprise 70% of the total. In other words, 70% of the large amount of rubber tested in this survey had a 700% modulus value between 86.4 and 111.6 kgs. per sq. cm. (1230 and 1590 lbs. per sq. in.). The extreme values found were 60.0 and 155.0 kgs. per sq. cm. (850 and 2200 lbs. per sq. in.).

These data have been presented merely to show the distribution of the 700% modulus value obtained in testing a large amount of No. 1 R.S.S. passing through a single factory and tested under the conditions existing in that factory. The samples were taken from blended batches after plasticizing. If other persons have records of the test of rubber made on a large scale so that the data could be analyzed statistically, the Committee would be very glad to have all possible information along these lines. It is also hoped that the presentation of these data may stimulate others to investigate this property, and in this way our information may be greatly increased.

7. Determination of Foreign Matter

The Crude Rubber Committee has given considerable serious attention to the determination of foreign material in crude rubber. The usual method of judging the proportion of foreign matter in a given lot of rubber is to draw several samples of the rubber and visually compare it with a given standard. Such a method has been used for years for grading on the market, but it cannot be considered as more than comparative. As a means of judging whether a given lot of rubber could be used directly in the manufacture of rubber materials, such as inner tubes—where a high degree of freedom from contamination is required—there is no question but that the visual inspection of a sample is of little practical value.

In undertaking this work of developing a test for determining the amount of foreign matter in crude rubber, the Crude Rubber Committee has not had in mind the purpose of bringing out a test which would be a substitute for, or replacement of, the method of market grading. The Committee is only concerned with a test which can be used by the rubber technologists to determine the dirt in any grade of rubber.

Two methods of determining foreign matter have been considered. The first method was based on solution of the rubber in benzol and determination of the foreign material by filtration, washing, and weighing. The disadvantages of this method were, first, the use of even a sample of 20 or 30 grams of rubber required the handling of a large volume of inflammable and toxic solvent; sec-

ond, the determination was tedious because of the viscous solution; and, third, the small size of sample rendered duplication difficult because a difference of only one or two grains of sand makes an appreciable difference in results.

The second method was based on a factory process of cleaning rubber. It has the disadvantage of requiring factory equipment and so is not universally adaptable and is also not so precise as a method completely carried out in a laboratory.

The Committee presents this method of determining foreign matter, merely as a procedure which it feels is of interest and value. It may require modification in order to adapt it to the equipment or needs of various crude rubber consumers, but the essential idea of the test can probably be worked out in most factories. The most advantageous use of rubber of any grade depends to an extent on our knowledge of the properties of that grade, but further than that, a knowledge of the properties of a given lot of rubber enables the user to get maximum value from it. This test is proposed with this idea in mind and is practical rather than scientific.

Procedure for Estimation of Foreign Material in Crude Rubber

A regular factory washing mill, as shown in the photograph, is used for this test. The size of the rolls, their speeds, and the type or depth of grooving are not specified, as there are so many variations of these particular items on satisfactory washing equipment that the Committee could not work out or specify any particular size, speed, or type. The only requirement is that the equipment must do a satisfactory job of washing rubber and do this in a fairly efficient manner.

Just below the rolls of the washer is the usual perforated pan. This catches the larger particles of rubber which are broken off and also protects the screens from damage. Below this perforated pan is a removable pan C, which has extension sides B to prevent any water from escaping before it has passed through the removable screen system A, which is placed at the lowest point of the pan C. The area of the screens used depends on the size of mill and the volume of water used, and should not be too large to handle easily. A size found practical for use on a 40-inch wash mill is 15 inches wide and 20 inches long.

The screen system is composed of two separate screens, placed one above the other with a space of about two inches between them. It is recommended that the top screen be 50 mesh, with openings approximately 0.01 of an inch in diameter. The lower screen should be a 100-mesh screen with openings 0.0059-inch in diameter. In the screen system A the photograph does not show the lower screen which is placed directly below the one which can be seen.

The following procedure is recommended for carrying out the test although, as stated before, different conditions may require alteration or modification. Using a carload of rubber as a unit of test, select 20 bales or cases and cut approximately 50 pounds or less from each bale or case, cutting across the edge so that a part of each sheet is included in the portion removed. The total 1000-pound (approximately) sample is taken to the washer which is fitted with the screens as described above. With the washer well opened, the pieces of rubber are passed between the rolls to put them in shape suited for washing. Care must be used that, after taking the samples, they are not exposed to the danger of picking up dirt from the floor or from other rubber in the factory, as contamination from this source would render the results meaningless.

After cracking the samples, the rolls are set to such an opening that the finished rubber is ¼-inch thick after the last pass through the washer. The rubber is passed through the washing mill six or more times, being doubled on itself each time. The flow of water is adjusted so as to pass away through the screen system readily, but provide as much water as is practical. The amount of washing will depend on the mill itself, and the operator will have to determine the exact procedure required to obtain satisfactory results on his own equipment. While it may be argued that occasionally lots of the lower grade rubber may be found which would require more than the standard number of passes established for that grade in order to remove all of the dirt, the use which the operator wishes to make of the test will determine how well or how completely he wishes the washing to be.

After the washing is completed, flush the mill and pans with a hose to force all foreign material on to the screens. Then remove and take the screens to the laboratory for the completion of the test. Wash both screens into a suitable container. Much of the material will sink to the bottom, but some rubber particles with foreign matter adhering to them, together with some of the wood and bark, will float.

Pour the floating material from the container through a 20-mesh screen held over a 100-mesh screen. This 100-mesh screen need not be the same one used at the washing mill, but is preferably a smaller one which is more convenient to handle in the laboratory. The 20-mesh screen will catch the rubber particles with adhering foreign material and allow the wood and bark to pass through to the 100-mesh screen. The material on the 20-mesh screen should be examined, and any large pieces of wood or bark should be picked off and placed with the material on the 100-mesh screen.

Dry the material retained on the 20-mesh screen at a low temperature (below 50° C.) to avoid making the rubber sticky. After drying rub this material gently over a coarse screen (16 to 20 mesh) to loosen the adhering foreign material, catching it on the 100-mesh screen used above. The material remaining in the original container is now poured through this 100-mesh screen, and all of the heavy substance is rinsed from the bottom on to the screen. The 100-mesh screen now contains all foreign substances found in the 1000-pound sample which are over 100-mesh in size, the rubber having been completely removed. These foreign substances consist of wood, straw, or fuzz from the container in which the rubber was shipped, iron scale from the washing mill, and sand, bark, and wood which were in the rubber when packed. Except by visual examination, the wood from packing cases can not be distinguished from wood accumulated in the rubber during manufacture.

The residue on the 100-mesh screen is washed with water, dried at 100° C., and weighed, and this weight recorded as (a). It is ignited, first at low heat and finally in a muffle, then cooled and weighed, and this weight recorded as (b). The loss (a-b) is considered to be the bark, wood, straw, or fuzz and is recorded as (c).

The residue after ignition is digested in concentrated hydrochloric acid in a beaker covered with a watch glass; the beaker is placed on a steam bath for several hours or until all the iron is dissolved. The contents of the beaker are washed several times by decantation with distilled water and finally dried in an oven at 100° C., and the weight recorded as (d). This loss in weight is considered as iron scale from the washing mill and not as dirt in the rubber. Tabulated, the test runs as follows:

Carload Lot
↓
20 Bales
↓
1000-Lb. Sample
↓
Screen System
↓
Flotation Separation

Heavy Material — Light Material
20-Mesh Screen
100-Mesh Screen ← Dry and Rub
↓
Dry and Weigh (a)
↓
Ignite and Weigh (b)
↓
Digest with Conc. HCl
↓
Wash by Decantation
↓
Dry and Weigh (d)

Foreign Material in 1000 Lbs. of Rubber—
Wood, Bark, Straw, or Fuzz = (a) — (b) = (c)
Sand = (d)
Total Foreign Matter = (c) + (d)

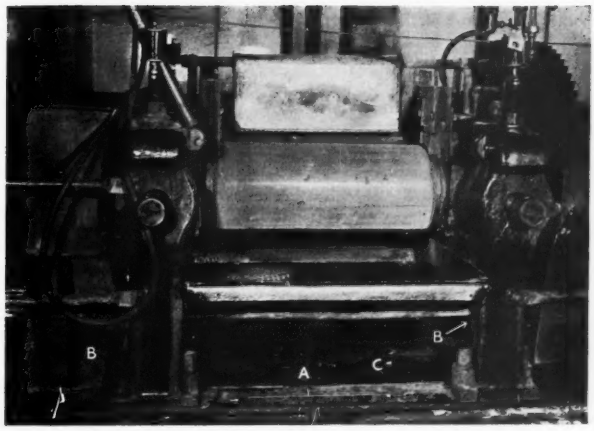
In order to show some results which have been obtained by the test the following data are given below. These figures are not presented as standards for the various grades and are definitely not to be interpreted as such, but merely as results of some tests made by the given procedure.

	Basis—1000 Lb. Samples (Grams)		
	Total Dirt	Volatile	Sand
No. 1X Ribbed Smoked Sheets..	3.2	1.9	1.3
No. 1 Ribbed Smoked Sheets..	4.5	2.5	2.0
No. 3 Ribbed Smoked Sheets..	14.4	4.4	10.0
No. 4 Ribbed Smoked Sheets..	18.9	4.2	14.7
No. 5 Ribbed Smoked Sheets..	44.3	14.0	30.3
No. 2 Brown Crepe.....	63.7	12.9	50.8
No. 2 Brown Crepe.....	133.1	48.1	85.0
No. 3 Amber Blankets.....	22.3	8.5	13.8
No. 3 Amber Blankets.....	13.8	2.9	10.9
No. 3 Amber Blankets.....	12.2	6.2	6.0
No. 3 Amber Blankets.....	142.3	62.4	79.9
No. 4 Brown Crepe.....	164.4	54.2	110.2

The data above show that different shipments or lots of the same grade of rubber may contain different quantities of foreign material.

Concluding Remarks

The Crude Rubber Committee presents this report with the hope that all members of the Division of Rubber Chemistry will consider all of the points covered with serious attention, and if anyone wishes to offer suggestions, comments, or critcisms, he will do so by writing directly to the Chairman or any of the Committee members. The same applies to any questions on any of the items. The Committee is particularly anxious to have comments on procedures already offered, including the test for foreign material described above.



Factory-Size Rubber-Washing Mill Showing Residue Pan C with Extension Sides B and Removable Screen System A for Collecting Foreign Matter

The task of drawing up tests or procedures for use of all technologists interested in crude rubber is not an easy one, and while every effort is made to draw up these procedures so that they will be generally useful, the Committee can neither accomplish the best results nor fully achieve its purpose without the interest and help of many members. Much remains to be done, and with the continued cooperation of the officers and members of the Division, the tasks will be accomplished.

G. A. Sackett (Chairman)
E. M. McColm
A. H. Nellen
E. W. Oldham
R. D. Parrish
R. D. Schatzel
J. C. Walton

Tire Stocks

(*Concluded from page 52*)

and so carried into the comparative summary totals.

Acknowledgment

The support of the R. M. A., the assistance of the National Association of Independent Tire Dealers, and the cooperation and promptness of dealers, oil-company distributers, manufacturers, and other mass distributers, in submitting data used in this report, are gratefully acknowledged. We especially thank all dealers who have submitted data and urge them to report regularly in future, as regularity is essential to trustworthy estimates of total dealers' stocks. The survey is open to participation by any tire dealer, and we will be glad to hear from dealers desiring to furnish data in order to receive our summary reports.

SALES OF TIRES IN THE PHILIPPINE ISLANDS IN JANUARY were below seasonal expectations despite lower prices. Stocks were heavy, owing to excessive imports during the latter part of 1939.

EDITORIALS

Crude Rubber Stocks and the Export Quota

AT ITS meeting in London on May 21 the International Rubber Regulation Committee fixed the quota of permissible export shipments by producing countries under the control at 80% of the basic quota for the third and fourth quarters of 1940. This action makes provision for permissible exports of 80% for the entire year 1940 as the same export quota had been set previously for the first half of the year. According to Associated Press reports, the Regulation Committee also requested the governments of rubber producing areas to issue as soon as possible export permits for rubber during the entire second half of this year.

While operating under the 80% quota, statistics for the first four months of this year indicate a resulting increase in United States stocks of 36,482 long tons, with an average monthly consumption of 51,276 long tons. Also the U. S. stocks afloat have been from approximately 40,000 to 50,000 long tons higher since September than during the previous months of 1939. Presumably much of this increase in stocks afloat has been necessary to compensate for the longer time in transit caused by rerouting of ships over a longer course. Nevertheless in the event of an interrupted supply it may be assumed that at least a large portion of the stocks afloat would be available eventually.

If similar performance as to U. S. imports and consumption is accomplished during the remaining eight months of 1940, as has been experienced throughout the past four months under an 80% quota, the result will be a further increase in domestic stocks of around 75,000 long tons, thus providing domestic stocks of about 237,000 long tons, or 4.7 months' supply. Under normal peacetime operations this would be quite a satisfactory inventory position, but under present conditions it certainly is none too high. In view of a probable increase in the consumption of crude rubber in the United States during the coming months the earliest possible attainment of such a position appears highly desirable.

If, as suggested by The Regulation Committee, the governments of the producing countries immediately issue export permits covering the balance of the year, the quantity shipped during the next four or five months will depend only on present accumulated stocks in the East, production capacity, and the market balance. Under present conditions it would appear that producers would now welcome an opportunity to ship to capacity and thus turn their production into cash as fast as possible. If a reasonable attitude toward the price of crude rubber prevails among the producers and the consumers and if the United States takes in all available rubber, a good opportunity is at hand for increasing the domestic stocks of this material which has become such a vital part of our life.

Inasmuch as consumers and the people of the United States through the government are collectively dependent on this commodity, some concerted and cooperative action appears to be desirable so as to insure the full realization of the benefits now possible.

American Youth and Industry

RECENTLY the University of Rochester sponsored a three-day "clinic on new economic opportunities for American youth." Leading educators and prominent industrialists discussed before the student body the preparation of youth for its place in business and the future opportunities in industry. Of especial significance today are some quotations from a talk on the subject, "Expanding Frontiers of the Rubber Industry," by David M. Goodrich.

"This is an opportune time to examine the new frontiers which are being developed in American life. . . . All of those things which we thought were the better things, won by mankind in centuries of struggle, are on trial—in our own country and throughout the world. . . . In a democracy, if we are to save the American enterprise system, it is not only necessary that we believe in it—it is necessary that we be eloquent in its defense.

"We are talking about two great forces: Education and Industry—with the aim of finding out how each can better serve American youth.

"In a larger sense, education itself is our biggest industry. We are hearing a great deal about research in industry, and this very clinic becomes a medium of research for new values in education. . . . There can be no greater hope than that our educational system will produce a great body of trained patriotic youth to tackle these new problems."

These points stimulate two main thoughts: first, on the present-day youth will fall the responsibility of preserving the principles for which generations have struggled or of accepting subserviency and restriction; and second, in the educators of today resides the power to shape the trend of thought which will control the future political and economic policies so influential on industrial and national progress. The selection of educators in view of their trend of thought is our most important problem and yet one which is often neglected. Industry in which our national life centers has a great stake in this problem. Close relation between industry and the preparation of youth for future responsibilities, as was furthered by this clinic, is desirable. May we have more of such gatherings.

S. C. Stillwagon

EDITOR

What the Rubber Chemists Are Doing

Rubber Division to Meet September 12-13

THE fall meeting of the Rubber Division, A. C. S., will be held in Detroit, Mich., on September 12 and 13. Division headquarters will be at the Book-Cadillac Hotel; while technical sessions will be held at Masonic Hall. The banquet will take place September 12. July 13 is deadline for papers, which should be sent to H. I. Cramer, c/o Akron University, Akron, O.

Woerner Talks on Pliolite at Los Angeles Meeting

IN THE absence of W. B. Holmes, chairman, Los Angeles Group, Rubber Division, A. C. S., the monthly meeting of the group, held at the Mayfair Hotel, Los Angeles, Calif., on May 7, was presided over by Lee Horchitz, vice chairman. The attendance of 112 was one of the largest of the season.

F. W. Woerner, of C. P. Hall Co., of California, spoke on Pliolite, Goodyear Tire & Rubber Co.'s cyclized rubber. The chemical reactions involved and the methods of manufacture were outlined briefly. Mr. Woerner then dwelt upon the properties of Pliolite and indicated its present and possible future uses in the paint, lacquer, and protective coating fields. Use of Pliolite in the paper coating field for labels and for moisture proofing of food packages was emphasized, and a few new developments were touched upon.

The program was concluded with the showing of a talking picture, "The Cavalcade of Chemistry," presented by Herman Jordan, of E. I. du Pont de Nemours & Co., Inc., which showed some interesting glimpses of the New York World's Fair. All those present were given a table favor, a flashlight-illuminated tongue depressor, made of Du Pont's Lucite and known as "Flex-Ray." The special prize, a table radio presented by M. Montgomery, of Martin, Hoyt & Milne, through the courtesy of Binney & Smith Co., was won by R. B. Olds, of Olds Alloys. The door prize, another radio, donated by Monsanto Chemical Co., through Art Kroeger, was won by C. A. Neville, of United States Rubber Co. The next meeting, the last of the current season, will be held on June 4. Ed Royal has been named chairman of a committee to make arrangements for the annual fishing trip this summer.

Detroit Group Meeting Attracts 150

THE spring meeting of the Detroit Group, Rubber Division, A. C. S., was held at the Hotel Leland, Detroit, Mich., April 26, with approximately 150 members and guests present. J. V. Hendrick, Chrysler Corp., spoke on "Synthetic Rubber in the Automotive Industry," pointing out a number of Chrysler parts employing "Thiokol," Buna, or neoprene. E. J. Kvet, Baldwin Rubber Co., substituting for L. A. Danse, Cadillac Motor Co., presented a talk on "A.S.T.M.—S.A.E. Standardization of Automotive Rubber."

First Meeting of Buffalo Group Scheduled for June 4

THE first formal meeting of the Buffalo Group, Rubber Division, A. C. S., will be held at the Hotel Lenox, Buffalo, N. Y., on June 4. Dinner will be served at 7 p.m., and at the meeting which will follow directly, officers will be elected.

A preliminary meeting of the group was held on April 24 at the home of B. W. Wetherbee, with the following in attendance: Michael Berman, Hewitt Rubber Co.; Warren Jones, General Cable Corp.; J. S. Plumb, U. S. Rubber Reclaiming Co.; W. R. Sheridan, Dunlop Tire & Rubber Corp.; and B. W. Wetherbee, Globe Woven Belting Co., Inc. Until the June meeting takes place, the affairs of the group are being handled by a temporary committee made up of those named above, with Mr. Plumb serving as temporary chairman.

Friday, June 14, Date of New York Group Outing

THE Green Meadow Club, Harrison, Westchester County, N. Y., has been selected as the site of the annual outing of the New York Group, Rubber Division, A. C. S., to be held on Friday afternoon, June 14, with all activities scheduled to start by 1:00 p.m. As chairman of the outing committee, J. de C. Van Etten, who has arranged a varied program of activities, will be assisted by F. F. Salaman (golf), A. R. Kemp (clock golf), J. Miscall (soft ball), J. H. Carroll (boccie), M. E. Lerner (tennis), S. C. Stillwagon (darts), S. G. Byam (baseball throw), W. F. Lamela (horseshoe pitching), and W. W. DeLaney (tug-of-war).

The Green Meadow Club may be reached by auto or train as follows:

By auto: *from George Washington Bridge*—north on Henry Hudson Parkway to Cross County Parkway to Hutchinson River Parkway to North St., Harrison; *from Whitestone Bridge*—to Eastern Boulevard to Hutchinson River Parkway to North St.; *from Connecticut*—via Merritt Parkway to Hutchinson River Parkway to North St.

By train: from lower level of Grand Central Station to Harrison Station where taxis to club are available. Trains leave every half-hour, 25 and 55 minutes after the hour.

Tickets for the outing, which include either a steak or fish dinner, are $2 for members and $3 for non-members and guests. An extra fee of $1.50 will be charged golfers who may play all day if they desire. Reservations should be made in advance with Peter P. Pinto, c/o *Rubber Age*, 250 W. 57th St., New York, N. Y. Those desiring to arrive early may obtain luncheon at the club from 85¢ up. A 5:25 p.m. train from Grand Central Station will permit members who cannot attend earlier to arrive in time for dinner.

Akron Group to Hold Outing June 14

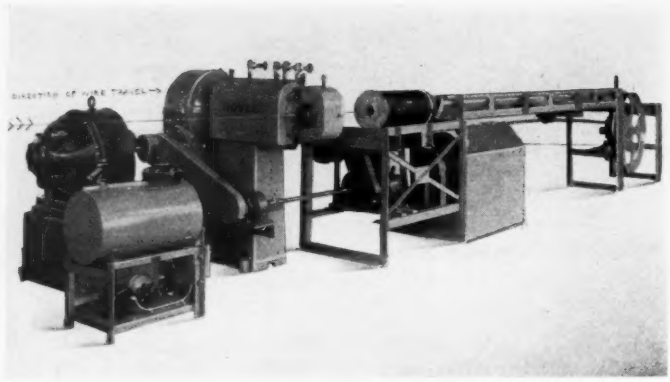
THE Akron Group, Rubber Division, A. C. S., will hold its summer outing on Friday, June 14, at the Silver Lake Country Club, Akron, O. A full day of activities, featuring golf, is being arranged. The outing will end with a banquet at which a number of prizes will be distributed. Jack B. Waite, who has been named general chairman for the outing, has appointed the following men to head the various committees: W. H. Vance (tickets and notices); L. V. Cooper (golf); C. B. Moore (prize distribution); C. F. Marshall (entertainment); Ferd Bonstedt (refreshments); V. L. Smithers (information); and W. S. Campbell and F. F. Dugan (publicity).

Annual Meeting of A.S.T.M. to Be Held in Atlantic City

THE forty-third annual meeting of the American Society for Testing Materials will be held at Chalfonte-Haddon Hall, Atlantic City, N. J., from June 24 to 28, inclusive. Committee D-11 on Rubber Products is scheduled to meet on Friday, June 28, at 2 p.m. Chairman O. M. Hayden's report will include the following: procedures for testing automotive hydraulic brake hose and for compression-deflection rate characteristics of vulcanized rubber; specifications for hydraulic brake hose and for first-grade motor mounting compounds; new tentative methods of test for dynamic compression flexing (compression hysteresis and heat build-up); new tentative specifications for ozone-resistant type of wire insulation; revisions in specifications covering three other types of rubber insulated wire and cable; revisions in the methods of testing rubber hose; inclusion in the methods of testing flat rubber belting of a kerosene-benzol swelling test. A technical paper, "The Standardization of Durometers," will be presented at this session by Lewis Larrick, of The B. F. Goodrich Co. The report of Committee D-13 on Textile Materials will be presented by Chairman H. J. Ball on Friday morn-

(*Continued on page 67*)

New Machines and Appliances



Complete Royle Equipment for Insulating with Plastics

Wire Insulating Equipment for Plastics

THE accompanying photograph shows complete equipment for insulating wire with plastics. From the supply reel, the wire to be covered passes through the head of a standard insulating machine, through an annealing furnace, through a water spray and bath, thence through a wiping pad, around a special capstan, and on to the take-up reel.

The oil heating and circulating system may be seen in the extreme left foreground, directly in front of the motor. The oil, after it is heated by an immersion-type heating element, is pumped into the cylinder, head, and die chambers to maintain proper extrusion temperature. The temperature of the oil is regulated by a thermostatic control. The entire set-up is powered from the extruding machine motor; a take-off from the driving shaft operates through suitable reducers and clutches to provide infinite control of all operations through strategically located regulators. John Royle & Sons, Paterson, N. J.

Self-contained Hot Plate Press

A CONVENIENTLY located work table and single handwheel control are features of a new self-contained hot plate press for laboratory or production work. The press has a capacity of 115 tons, 24- by 24-inch platens, and a six-inch stroke. Platens may be either of the steam heated or electrically heated type.

A two-pressure pump is driven by a three horsepower motor, but the pump need not run continuously to maintain a predetermined pressure during long cures. The side slab construction of the press is said to assure positive platen alinement and to reduce radiant heat losses. The pressure may be quickly adjusted over a wide range up to 1,150 pounds per square inch. Baldwin Southwark Division of The Baldwin Locomotive Works, Philadelphia, Pa.

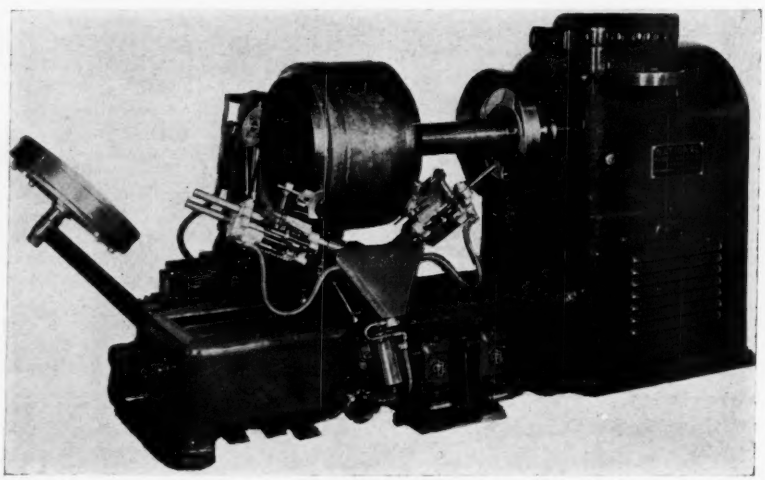
Southwark Hot Plate Press

Semi-Automatic Tire Building Machine

THE Model 39 semi-automatic tire building machine is adaptable for all passenger-size tires up to and including 8.25 by 16 and is equipped with rear and tread stitchers, turn-up tools, and bead setters.

The rear stitchers are of the spring-belt type with adjustment for size and width of drum and with angular adjustment in two directions for proper contact with the drum. They are used to stitch the fabric to and beyond the bead seat, an operation that requires little more than one revolution. The tread stitchers, also of the spring-loaded type, are so constructed that the maximum of pressure is applied at the points of greatest thickness of tread. These stitchers are equipped with air cylinders and springs for pressure and are motor driven through a thread screw for horizontal movement. The turn-up tools which are mounted on the extended base are said to turn up the plies over the beads without wrinkling the fabric. The bead setters are of the conventional ring type. Rear stitchers, turn-up tools, and bead setters are all air operated and controlled by foot pedals. The tread stitcher is started by a pull button, and thereafter the stitcher is automatic in action.

The drum is driven by a two-speed reversing-type motor; while the drum brake is actuated by a foot-pedal controlled air cylinder. The machine occupies a floor space seven feet long by three feet four inches wide. National Rubber Machinery Co., Akron, O.



National Semi-automatic Tire Building Machine

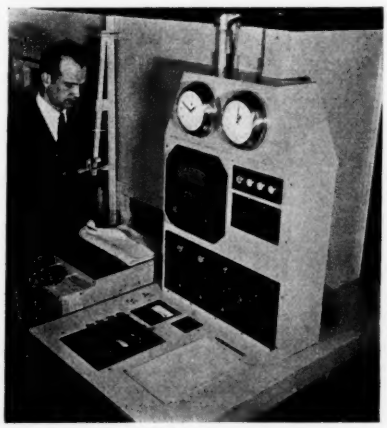
Smoke Alarm and Densometer

THE Photoswitch smoke alarm with densometer indicates continuously the density of smoke in the stack of a power plant and signals, by means of a red light, when this density exceeds any predetermined value consistent with efficient combustion. The apparatus consists of a photoelectric control and light source, mounted on opposite sides of the flue, and a combination densometer and light signal, which may be located at any convenient place in the boiler room. Photoswitch Inc.

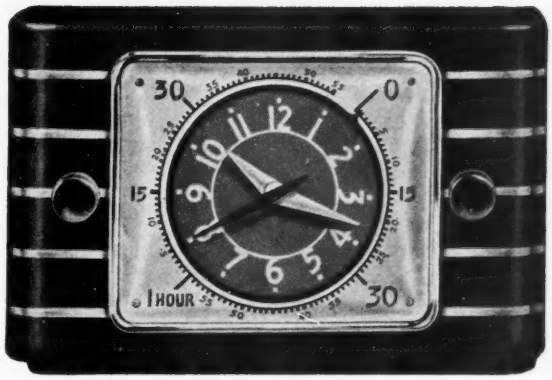
Warmth Test Apparatus

SHEET materials, including rubberized fabrics for clothing, are tested for warmth quality with an apparatus of the guarded hot-plate type, together with a weather-controlled duct system. Specimens to be tested are first conditioned in a room at 70° F. and 65% relative humidity for 48 hours and then laid flat on an electrically heated copper plate with a heat emissivity equivalent to that of the human skin. The plate and the sample, held in place by a retaining ring, are transferred to a recirculating air duct system, equipped with a blower, refrigerating unit, heating coils, and control equipment. These units are adjusted to give weather conditions (temperature and wind velocity) above the upper exposed surface of the sample that are representative of service conditions. The heat transmitted through the fabric sample is determined from measurements of the electrical input to the warm plate necessary to maintain the plate and inner surface of the sample at body temperature. Guard plates eliminate heat losses from the plate.

The test data give a measure of the heat passing through the sample of one square foot area in British thermal units per hour per degree F. difference maintained on opposite sides of the fabric. These figures are then converted into a form that gives a comparative warmth coefficient for the test conditions used. This coefficient is proportional to the heat retaining capability of the sample. United States Testing Co., Inc.



Conducting Test on Warmth Apparatus

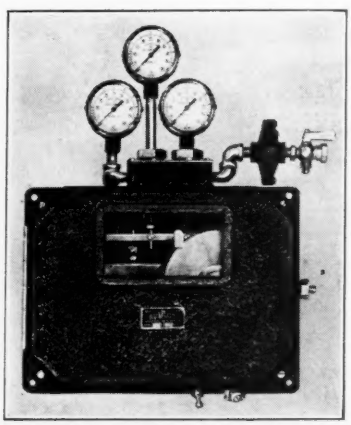


Minute Minder

Electric Heater for Koroseal Compounds

KOROGEL and Korolac, compounds of Koroseal, are melted and heated uniformly under close temperature control in a Sta-Warm heater, especially developed for this purpose. The container is porcelain enameled; while the heating unit, which is of the electrical type, is cemented and baked to the outer wall and bottom of the container. The temperature is controlled by a variable control thermostat. Sta-Warm Electric Co.

Sta-Warm Heater for Koroseal Compounds



Model CSC Time Cycle Controller

Motor-Operated Interval Timer

A SELF-STARTING synchronous motor actuates this interval timer which may be used for any pre-set interval up to one hour and 55 minutes. Known as the Minute Minder, this clock provides accurate-to-the-second time at a glance and after the set interval has expired sounds a pleasing chime. By means of a counting bell an audible signal may be repeated if desired, once every second, as long as required. The timer plugs into a 110-volt, 60 cycle, A.C. outlet. The knob on the left sets the clock dial hands; while the one on the right sets the indicator for the desired interval. The signal chime is shut off by depressing the left knob. A. Daigger & Co.

Time Cycle Controller

IN THE model CSC time cycle controller the choice of 27 different length cycles are obtainable by the simple shifting of a gear shift lever. The time ratio of one operation to another is varied by the rotation of a cam segment or segments in relation to the main cam. For intricate or radical changes in operating cycles it is necessary to replace the main cam with a special cam cut to requirements. The complete controller comprises: two air pilot valves, three gages, air strainer and shutoff cock, a Micro switch, starter button, and a synchronous motor.

The synchronous motor and mechanically geared drives are said to provide unvarying timing with a time selection which can be completed in a few seconds. All gears are machine cut, and the controller is equipped with ball bearings throughout. The mechanism is mounted on a cast aluminum base and housed in a dust- and moisture-proof case, which can be quickly removed to afford accessibility to working parts. Seely Instrument Co., Inc.

New Goods and Specialties

Bullet-Resistant Tire Tube for United States Army

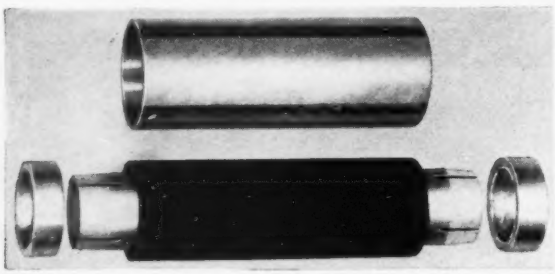
A BULLET-RESISTANT and self-healing inner tube for use with tires on United States military vehicles is believed to be far superior to tubes in the possession of any foreign army, according to F. B. Davis, Jr., president of United States Rubber Co., 1230 Sixth Ave., New York, N. Y., producer of the tube. In a test the tube, inflated at 60 pounds' pressure, lost little of its carrying efficiency after penetration by 29 bullets, and the penetration points of these bullets could, in most instances, only be ascertained with difficulty. It is further claimed that the construction of the tube is such that the loss of much of its air inflation would make very little difference in its load carrying efficiency. Severely high temperatures are said to have no effect on the tube's characteristics, and tests have disclosed that it will not lose its self-healing qualities at temperatures as low as –39° F.

The War Department has approved the production and sale of the tube to foreign armies, subject to State Department policies, and provided that the orders are for sufficiently large quantities and approved in each case by the War Department. Object of foreign sales is to provide for factory facilities necessary to any emergency production for War Department vehicles.

Akerite Marine Bearing

THE Akerite rubber marine bearing for propeller shafts, as shown in the illustration, consists of an outside bronze bushing secured to the stern strut with set screws and a bearing of tough rubber, vulcanized to an inner bronze sleeve. Lock rings at the ends firmly hold the sleeve on the propeller shaft. The bearing rotates with the shaft and thus eliminates any possibility of shaft wear. This feature also permits the use of the bearing on worn shafts. When revolving, the bearing acts as a rotary pump, forcing water through the holes of the outer bushing to provide lubrication.

The bearing can also be used in other applications wherever it may come in contact with water, for example, on irrigation pumps and cranberry separators. The E. J. Willis Co.



Rafts for Airplanes

INFLATABLE rafts made of rubberized fabric are carried on certain types of airplanes to be used in the event of a forced landing on water. The rafts are boat-like in shape with raised prows and tapered lines; they float high in water and are easy to row. Collapsible oars are carried in the pockets of each raft. Deflated and packed in comparatively small zipper cases, these rafts occupy but little space in an airplane. Instant inflation is obtained from a container of carbon dioxide under pressure. The Goodyear Tire & Rubber Co.

Butane-Propane Hose

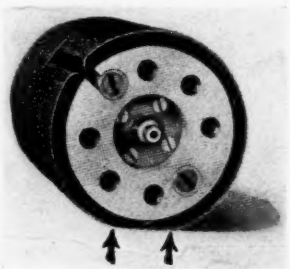
A HOSE for handling liquefied butane and propane gas consists of a synthetic tube and a fabric-reenforced rubber cover. Sizes range from ⅜-inch to three inches in diameter, and sizes ½-inch or larger have built-in static wire. The use of these petroleum gases, which are shipped and stored in liquid form under pressure, is said to be increasing in homes, retail establishments, and industries, especially in rural areas. The B. F. Goodrich Co., Akron, O.

Sanding Machines Find Need of Rubber

TWO recent applications of rubber, for two different types of sanding machines, serve to illustrate the increasing interest in this material on the part of machine designers. The sanding drum (illustrated) of a floor sander is covered with a sponge rubber pad, adhesively secured to the metal cylinder. The resilience of the rubber pad widens the effective sanding surface as the sandpaper, wrapped over the pad, comes in contact with the floor.

The other machine, a lightweight three-inch belt sander for fine work, utilizes a driving pulley, consisting of a steel insert, a hard rubber core, and a soft rubber surface layer, all integrally bonded together. Skilsaw, Inc.

(Below) **Disassembled Rubber Marine Bearing**



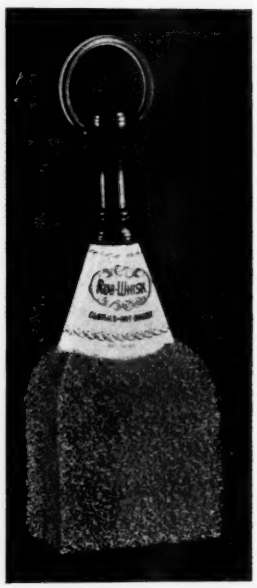
Sponge Rubber Covered Drum for Floor Sander (Arrows Indicate Greater Width Obtained through Use of Rubber)

Rubber Mudguards for Buses and Trucks

DREADNAUGHT rubber mudguards are being used on trucks and buses by transportation companies in a number of large cities where congested areas exist. The mudguards are made with fabric reenforcement and high tensile rubber stocks, which are said to provide for a structure resistant to tearing and damage. The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.

Bus with Rubber Mudguard

Section of Butane-Propane Hose



The sponge rubber used in place of ordinary straw in this whiskbroom, known as "Rub-Whisk," efficiently removes lint and dust from clothes, hats, and upholstery. The Joe Weil Associates.

UNITED STATES

Extension of the War Abroad Affects Prospects of Improvement in Business Here

The rapid spread and uncertainty of hostilities in Europe had repercussions here on an otherwise favorable outlook. Most markets reacted unfavorably. United States exports, in general, have been declining as German invasions and the resulting extended blockade eliminate additional markets from world trade. Agricultural products seem hardest hit. Exports of industrial machinery, though, will reach an all-time high in 1940 if foreign shipments maintain the pace of the first quarter.

Federal economists predict that expenditures for the American defense plan will substantially stimulate industry by midsummer. Another authority, judging by averages of past election years, believes business activity and securities markets will show rises for the latter half of this year.

Industrial activity at present continues at about the pre-war level although recently new orders have increased for several classes of industrial goods. It is expected that manufacturers will maintain large inventories to guard against higher prices and possible shortage of supplies, as they did when hostilities began in September. Employment is gaining, with an attendant rise in purchasing power. Lack of skilled help still is a problem.

Machine tool activity remains unchanged at the high levels of March. Gains were recorded last month in oil and power output, the cotton mill rate, construction awards, carloadings, tin output (up to 70%), and steel operations (up to 78%), with further improvement anticipated. Lumber output fluctuated, ending on an improved note. But shoe production was down again, and output for the first four months of 1940 is under that of the corresponding period last year.

Automobile production advanced. Second quarter operations are expected to be maintained at a profit-making level. Retail sales declined as April ebbed, but in May were well ahead of normal expectations. April output of cars and trucks was estimated at 447,400 units, 2% above March and 26% above April, 1939. For the first four months of 1940 the figure was 1,758,445, 24% above a year ago. March truck exports were boosted by the war to an all-time high, 15,606 units. Releases on 1941 model tools and dies indicate car changes of a magnitude rarely equaled in the industry.

The value of manufacturers' inventories of rubber products was 1.3% higher on March 31 than on February 29 and 15.9% higher than on March 31, 1939. The value of manufacturers shipments of rubber products rose 10.6% in March against February and 0.5% above March, 1939. The value of U. S. imports of rubber goods was 45.8% greater and exports 25.7% greater in the first quarter of 1940.

The rubber industry is holding its own at present. Most activity occurs in mechanicals and sponge rubber goods. Tire replacement business has not yet developed as anticipated although some stimulus was afforded with the recent new low-priced tires in popular sizes. Insulated wire still reports unfavorably. Manufacturers of rubber machinery are fairly busy.

EASTERN AND SOUTHERN

1940 Fair Previews of Goodrich, Firestone, and Du Pont

Preliminary to the opening of the 1940 New York World's Fair, previews of their remodeled and expanded exhibits were held by The B. F. Goodrich Co., The Firestone Tire & Rubber Co., and E. I. du Pont de Nemours & Co., Inc., on May 7, 8, and 10, respectively. These previews demonstrated that all of these exhibits, tremendously popular last year, have been markedly improved by retaining the outstanding features of 1939 and adding many new attractions.

The auto rodeo, featuring Jimmy Lynch and his "death dodgers," remains the outstanding attraction at the Goodrich exhibit. Two comely young ladies have been added to this auto troupe, which demonstrates the safety and durability of Goodrich tires. Firestone has added a Liberian jungle section to its exhibit, featuring a rubber plantation and live animals in a tropical background. Other new attractions include an earth mover with huge tires and a racing auto equipped with special Firestone tires.

Du Pont's "Wonder World of Chemistry" exhibit is headlined by nylon with the actual knitting of stockings being performed. The neoprene exhibit this year will place emphasis on the resistance of this material to oils, fats, greases, sunlight, and ozone; while a number of representative neoprene products are on display. Another innovation is a stage show.

CALENDAR

June 3-6. National Assn. of Purchasing Agents. 25th Annual International Convention and Inform-A-Show. Hotel Netherland Plaza. Cincinnati.

June 4. Buffalo Rubber Group, Hotel Lenox.

June 4. Los Angeles Rubber Group, Mayfair Hotel.

June 6-8. 17th National Colloid Symposium, Division of Colloid Chemistry, A. C. S. University of Michigan, Ann Arbor.

June 14. Akron Rubber Group, Annual Outing, Silver Lake Country Club.

June 14. New York Rubber Group Outing. Green Meadow Club, Harrison.

June 17-22. A.S.M.E. Three-City Summer Meeting: June 17-20. Hotel Pfister, Milwaukee, Wis. June 20-21. University of Michigan. June 19-22. Berkeley-Carteret Hotel, Asbury Park.

June 24-28. A.S.T.M. Annual Meeting. Atlantic City. Committee D-11 on June 28.

July 19. Boston Rubber Group, Annual Outing, Weston Country Club, Weston, Mass.

Sept. 12-13. Rubber Division, A. C. S. Annual Meeting. Book-Cadillac Hotel, Detroit.

Oct. 7-11. National Safety Council. 29th Annual Safety Congress and Exposition. Stevens Hotel, Chicago.

Oct. 12-19. National Automobile Show, Grand Central Palace, New York.

Dec. 2-7. 14th National Exposition of Power & Mechanical Engineering. Grand Central Palace, New York.

Neoprene Type GN

A new and improved type of neoprene, recently announced by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., can be brilliantly colored and will not discolor appreciably in sunlight. This product, known as Neoprene GN, is supplied in small rod-shaped pieces which can be easily plasticized to any degree of softness. Like Neoprene Types G and GW, Type GN is for all practical purposes odorless. Other advantages claimed for Type GN are its freedom from staining lacquer and its adaptability to fabrication because of its rubber-like tackiness, and its fast curing rate. The recommended method of plasticizing is milling with Latac (hexamethylene ammonium hexamethylene-dithiocarbamate), recently introduced as an accelerator.

The O'Sullivan Rubber Co., Inc., manufacturer of heels and soles, Winchester, Va., recently moved its New York, N. Y., sales office from 511 Fifth Ave. to 366 Madison Ave.

Pittsburgh Plate Glass Co., Pittsburgh, Pa., has announced that President H. S. Wharrett has been elected president of its subsidiary, The Columbia Alkali Corp., New York, N. Y., succeeding Hugh A. Galt, retired.

Du Pont Executive Changes

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., on May 20 held a directors' meeting at which many executive changes were approved, effective immediately. Because they felt they had reached "retirement age," Pierre S. du Pont, Irénée du Pont, and Lammot du Pont resigned as chairman of the board, vice chairman, and company president, respectively. They will, however, remain as directors and members of the finance committee, with Lammot du Pont chairman of the board. The retiring president, who also resigned as chairman of the executive committee, which, incidentally, reduced its membership from nine to eight, was succeeded as head of the company and chairman of the executive committee by Walter S. Carpenter, Jr., formerly a vice president, vice chairman of the executive committee, and chairman of the finance committee. His successor to the last-named post is Vice President Angus B. Echols. Treasurer J. B. Eliason was also made a vice president and a director.

The United States Department of Labor, Washington, D. C., among its recent awards of government supply contracts includes: Navy, *cable:* General Electric Co., Schenectady, N. Y., $17,576, Okonite Co., Passaic, N. J., $39,055 Habirshaw Cable & Wire Division, Phelps Dodge Copper Products Corp., New York, N. Y., $25,655, Rockbestos Products Corp., New Haven, Conn., $23,191; *manganese linoleate:* American Cyanamid & Chemical Corp., New York, $11,400; *nitrate of sodium;* Barrett Co., New York, $14,700; *packing:* Manhattan Rubber Mfg. Division, Raybestos-Manhattan, Inc., Passaic, $9,737; Procurement, *basketballs, etc.:* Davega City Radio, Inc., New York, indefinite amount; *tires and tubes:* Armstrong Rubber Co., Inc., New Haven, indefinite amount; WPA, *water gas tar:* Barrett, $17,015.

R. H. Macy & Co., a leading department store in New York, N. Y., now sells tires under the name "Supre-Macy." Prices, according to the company, will make the 40% off list "an every-day low price with no special deals."

Whittaker, Clark & Daniels, Inc., 260 West Broadway, New York, N. Y., at a dinner at the Hotel Biltmore on May 3, attended by more than 200 employes and friends, held in honor of President Samuel H. Clark's 42 years of service with the company, celebrated its fiftieth birthday. Mr. Clark was given a gold watch by company employes as well as other gifts by friends and business associates. His son, Vice President Clarence E. Clark, was toastmaster, and speakers included Secretary-Treasurer John A. Franklin, Vice President Harold G. Robinson, and Assistant Secretary W. Wallace Riff.

Scrap Rubber Grinding Service

The increased use of ground scrap for compounds utilized in different rubber products has opened a field for the grinding of this scrap for rubber manufacturers who do not have facilities for this work. Such a service is offered by A. C. Wheeler, 5-17—46th Rd., Long Island City, N. Y., who is well equipped for grinding problems.

Thermoid Co., Trenton, N. J., has contracted with the National Outdoor Advertising Co. for an extensive billboard advertising campaign of its brake lining. The company's posters, to be along the main highways throughout the United States, will read: "For quieter safer highways and even stop rely on your brakes and not your horn. Insist on Thermoid Brake Lining." Thermoid has also announced that mayors and police chiefs of many of the leading cities will cooperate with the company in cutting down accidents with good brakes on cars. The mayor and police chief of Little Rock, Ark., will issue one of the Thermoid stickers to all motorists. The Thermoid concern is very busy at present.

Trenton, N. J., rubber manufacturers in general report better business. Road salesmen are optimistic over trade for the coming summer. Companies enjoying an upswing include Pocono Co., Nearpara Rubber Co., and Essex Rubber Co. Puritan Rubber Co., however, finds business "fairly good;" while Pierce-Roberts Rubber Co. notes a decrease in orders.

Martin Rubber Co., Inc., manufacturer of dental supplies, gaskets, washers, molded specialties, sponge, and tubing, Long Branch, N. J., according to President Walter L. Tepper, has appointed as general plant superintendent A. L. Matelik, formerly with the Franklin Rubber Corp. and the Quaker Rubber Corp., both of Philadelphia, Pa.

Charles E. Stokes, president, Home Rubber Co., Trenton, N. J., and Mrs. Stokes have returned from Skytop in the Pocono Mountains.

Mercer Rubber Co., Hamilton Square, N. J., is operating normally. Wm. H. Sayen, president and treasurer, was on a business trip through western Pennsylvania.

The United States Rubber Co., 1230 Sixth Ave., New York, N. Y., held its regular monthly board meting on May 9 at which Lammot du P. Copeland was elected a director to succeed Wm. P. Allen.

Fred H. Pinkerton, manager of sales promotion, U. S. Rubber, mechanical goods division, was elected president of Industrial Marketers of New Jersey, local chapter, National Industrial Advertisers Association, at a meeting on May 22 at the Newark Athletic Club.

Marking Retreaded Tires

The State of New York has passed an amendment to Chapter 25 of the laws of 1909, entitled "An act relating to general business, constituting Chapter 20 of the consolidated laws," by adding a new section, 391, reading as follows and effective July 1, 1940:

"Marking retreaded, recapped or recut tires. No person, firm, association or corporation shall sell, offer or expose for sale, or have in his possession with intent to sell any motor vehicle tire or motor cycle tire which has been retreaded, recapped or recut unless the fact that such tire has been retreaded, recapped or recut is plainly shown by a mark or label in the English language on both side walls thereof. A violation of this section shall constitute a misdemeanor."

Crescent Insulated Wire & Cable Co., Trenton, N. J., reports improving business after a general slow-up in all departments. Vice President C. Edward Murray, Jr., recently was elected president of the Trenton Country Club; while A. Boyd Cornell, secretary of the Hamilton Rubber Mfg. Co., Trenton, was reelected a director.

Cameron Machine Co., manufacturer of slitting and roll winding machines and winders and rewinders, 61 Poplar St., Brooklyn, N. Y., has sent Service Manager R. W. Cummings to the West Coast to call on rubber mills there in an endeavor to give personal attention and service to Cameron customers. Mr. Cummings, who has been with the company eleven years, left May 29 and during his four-week trip will visit Seattle, Portland, San Francisco, and Los Angeles.

Hewitt Rubber Corp., Buffalo, N. Y., recently moved its New York, N. Y., office to 70 Pine St.

R. J. Goehrig, treasurer, Whitehead Bros. Rubber Co., Trenton, N. J., was on a business trip through the Midwest and along the West Coast.

Trunk Line & Central Passenger Association railroads and the **American Drivurself Association** have announced a new train-auto travel service throughout the East, effective May 1. This service combines the advantages of railroad travel between cities and private automobile operation locally at destination.

Jos. Stokes Rubber Co., Trenton, N. J., has completed a two-story building to contain hydraulic and other equipment. The addition and the equipment cost approximately $20,000. The company continues busy.

Martindell Molding Co., Ewing Township, near Trenton, N. J., will erect a one-story building for use as a shipping room. The concern continues to operate night and day shifts.

OHIO

N.A.P.A. Convention

National Association of Purchasing Agents, 11 Park Place, New York, N. Y., will hold its silver anniversary international convention and Inform-a-Show from June 3 to 6, inclusive, at the Netherland Plaza Hotel, Cincinnati, O., with an expected attendance of 2,000 purchasing agents from the United States and Canada, who will consider trends in business and commodity markets, with particular emphasis on the effect of war or peace on them. Among the scheduled speakers are: George E. Price, Jr., vice president, District No. 6, N.A.P.A., and purchasing agent of Goodyear Tire & Rubber Co., Akron, O.; Sydney E. Webster, chairman, Council of Canadian Purchasing Agents' Associations, and purchasing agent of Dominion Textile Co., Ltd., Montreal, P. Q., who will discuss "Today's Purchasing Problems in Canada;" Robert C. Kelley, chairman of the Textile Committee, N.A.P.A., and purchasing agent, Converse Rubber Co., Malden, Mass., who will talk on "Textiles—The Current Situation;" Thos. W. Harris, Jr., chairman of the Coal Committee, N.A.P.A., and division purchasing agent, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., who will consider "Coal—The Current Situation;" J. R. Keach, purchasing agent, Ohio Rubber Co., Willoughby, O., who will speak on "Industrial Chemicals—The Current Situation;" Benedict Van Voorhis, chairman of the Chemical and Allied Products Buyers' Group, N.A.P.A., and du Pont division purchasing agent, Arlington, N. J.; and Milton L. Draper, assistant division purchasing agent, du Pont, Wilmington.

Seely Instrument Co., Inc., manufacturer of cycle, pressure, and temperature controllers and hydraulic and standard valves, 2249 14th St., S.W., Akron, is an incorporation of the former partnership owned and operated by Glenn H. Seely and E. B. Sutherland. The rapid growth of the organization was one of the many reasons for the change in corporate structure, but no new capital was taken in or stockholders added. It is a closed corporation with three people holding stock: Mr. Seely, president and treasurer; Mr. Sutherland, vice president and secretary; and Mrs. Glenn H. Seely, assistant secretary.

Aetna Rubber Co., Cleveland, at its recent annual stockholders' meeting re-elected the following officers: president, Charles Mashek; vice president, Thomas M. Sourbeck; secretary-treasurer, E. W. Ferry. New directors include Gordon Carr and Philmore J. Haber. The company is expanding its production operations by adding a line of molded refrigerator parts.

Tire Renewal under Controlled Conditions

Many worn and discarded tires are not suitable for retreading or recapping, but when properly selected carcasses are used, and the renewed tire is properly balanced, very good results can be obtained. The Kraft System of tire renewing recently devised by Herman T. Kraft and endorsed by The General Tire & Rubber Co., Akron, provides for the selection of worn tires by the "Inspect-o-Scope," a patented instrument controlled exclusively by General Tire, with which the operator listens through a stethoscope-like device to the sound produced by an electric vibrator when applied to the various parts of the spread tire. After the old rubber is buffed off and before the tire is newly vulcanized, the latter is balanced on a patented Kraft System balancer, said to be accurate to a fraction of an ounce.

It is understood that licenses to operate under the Kraft System are granted on the condition that the licensee obtain the services of an operator who has been trained at the General Tire factory to operate the system under factory-specified conditions.

Correction

On page 58 of our May issue under Firestone news, "McCoy on Leave," we referred to Charles F. McCoy, Jr., as Firestone research director. This is an error. Mr. McCoy was formerly in charge of personnel research.

The Eagle-Picher Sales Co., Cincinnati, according to Vice President Miles M. Zoller, appointed, effective May 1, Otto Hense, eastern representative of the Pigment Division, to the newly created post of sales manager of the division, with headquarters at the general offices in Cincinnati. Mr. Hense is a graduate of the Case School of Applied Science, Cleveland.

Foster Dee Snell, head of Foster D. Snell, Inc., consulting chemical service, 305 Washington St., Brooklyn, N. Y., recently addressed the Case Student Chapter of the American Institute of Chemical Engineers at Cleveland, O., on "Opportunities in Chemistry and Chemical Engineering." The functions of both the chemist and the chemical engineer in research were discussed as there is as much engineering as chemistry in such problems.

Seiberling Rubber Co., Akron, through Harris Waite, export manager, has reported that exports sales of the first half of its current fiscal year are the highest in five years; and if sales continue to grow in volume as they have since January 1, a new export sales high will be established during the current year. Totals for several of the months in the period under review ran as high as 40% above corresponding months in five previous fiscal years.

Goodyear Announcements

The Goodyear Tire & Rubber Co., Akron, has liberalized its vacation plan to give one week's vacation to everyone on piece work or hourly rating who has had two years' continuous service up to January 1, 1940, and two weeks' vacation to those having five years' continuous service.

New Low-Price Tire

Aiming at the low-priced replacement field, Goodyear recently introduced the All-American tire, made in sizes that will cover 70% of the current market. The new tire has a new multiple-rib tread design and carries the company's standard lifetime guarantee.

Growth of Gadsden, Ala., Plant

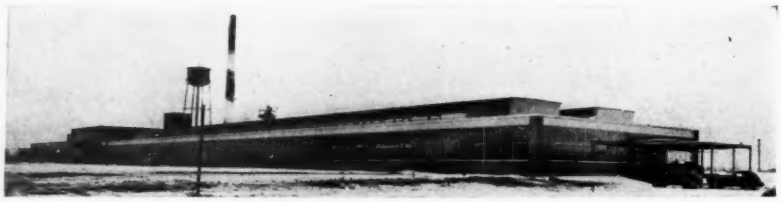
Fifteen Goodyear directors held their annual meeting on April 29 at the Hotel Reich, Gadsden, Ala., and then toured the company's tire plant there. The next day they visited the three Goodyear cotton mills in Georgia, then returned to Gadsden. Accompanying the party were public relations officials and some operating heads from Akron. At the meeting President Paul W. Litchfield announced the resignation of Director George T. Bishop because of ill health. A. G. Cameron, since 1922 vice president and general manager of Goodyear's export company, was named Mr. Bishop's successor.

Speaking before a group of business men of the South, following the directors' meeting, Mr. Litchfield stated that since the Gadsden plant was opened eleven years ago, it has built more than 18 million tires; the company has added a reclaim plant as well as other factory additions, the most recent of which, completed three months ago, represents a quarter-million dollar investment in additional tire capacity; the Gadsden annual payroll is running over two million dollars.

Mr. Litchfield further stated that the Goodyear company, the largest consumer of southern grown cotton in the rubber industry, last year bought and used more than 60 million pounds of the commodity. Practically all the fabric used in Goodyear tires and other products is woven in the South.

St. Marys Plant

The second of two new Goodyear plants in St. Marys, O., began operation in late March producing Pliofilm. The first St. Marys plant began production of molded and extruded goods in January, specializing in products for automobiles, refrigerators, washing machines, etc. Total floor area of the two plants, which are located on a 60-acre tract, is 90,000 square feet. The two main brick buildings are of single-story monitor type with structural steel frame and steel sash. In addition to these two buildings which house the manufacture of mechanical goods and Pliofilm, the boiler room, pump house, and switchboard are housed in two separate buildings. The mechanical goods plant and power units represent an investment of approximately $1,000,000;



Goodyear St. Marys Plant

while the pliofilm plant cost about $800,000.

Goodyear Dealer Honored

Mr. Litchfield, on May 17 at Goodyear's main office, presented to Charles Lebzelter, of Lancaster, Pa., a bronze plaque marking 40 years of unbroken association as manufacturer and dealer. The recipient is a nephew of the founder of Philip Lebzelter & Son Co., which started in 1848, specializing in manufacturing carriage wheels, and added rubber tires with the advent of the automobile. When Philip Lebzelter died in 1906, the business was entrusted to his son, William, and the nephew, Charles. Others present at the presentation ceremony were David Reamer, for many years head of the Lebzelter tire division; D. W. Sanford, manager of Goodyear's northeast division; Victor Holt, Jr., manager, Harrisburg district; H. E. Blythe, sales manager of Goodyear tire departments; and R. S. Wilson, Goodyear vice president in charge of sales.

Goodrich Reports

The B. F. Goodrich Co., Akron, is increasing its warehouse facilities, adding approximately 100,000 square feet of space at its plant in Oaks, Pa., according to A. W. Phillips, general manager of the Oaks division.

Anticipated Summer Auto Travel

Vice President James J. Newman believes 1940 will be a record motor travel year. Based on increased winter vacation travel by automobile which is expected to continue throughout the year, because of hostilities abroad and the expositions at San Francisco and New York, summer traveling by car is expected to be 15% greater than in 1939 when, according to the American Automobile Association, 15 million automobiles carried 52½ million persons on almost 48 billion miles of vacation trips, Mr. Newman said. Thus 1940 is estimated to see 17¼ million autos bear 60⅜ million vacationists spending more than five billion dollars over 55 billion miles.

According to U. S. Travel Bureau statistics, of the sum to be expended by motorists 58% goes for gasoline, oil, tires, automotive accessories, and other transportation costs, 22% for recreation, 10% for food, 5% for accommodations, and 5% for refreshments and incidentals. Approximately 300 million dollars is spent on soda pop, hot dogs, peanuts, and candy purchased at wayside stands and stores.

Mr. Newman also pointed out that predictions he made regarding the effects of the New York and San Francisco fairs on 1939 motor travel had been confirmed by sales of 38 million replacement tires by the rubber industry last year.

Falls Rubber Co. of Akron, Inc., Findlay, manufacturing and distributing automobile tires, has entered into a stipulation with the Federal Trade Commission, Washington, D. C., whereby it will desist, in connection with the sale or distribution of certain tires, from marking, stamping, branding, or labeling them "Silent Safety Six," "Heavy Duty 6," or with any other similar phrase implying that the tires have six plies. The corporation also agrees to cease and desist from use on its tires or their wrappings, or in connection with the advertisement, sale, or distribution of such tires, of any mark, stamp, brand, or label which imports or implies that such tires have more plies in their construction than they actually contain.

The James F. Lincoln Arc Welding Foundation, Cleveland, is conducting a contest for reports describing advances and improvements made between now and June 1, 1942, by application of arc welding to industrial work, including design, manufacture, fabrication, construction, welding service, and maintenance. The product or structure may have arc welding actually applied to it within the period or it may simply be designed or redesigned within the period to utilize arc welding; in either case the report should include a design and description bringing out advances and improvements. Prizes, totaling 458 in number, will amount to $200,600 in all. Included among the subject classifications in the contest are industry machinery, which covers rubber making machinery, with eight awards ranging from $150 to $3,000; maintenance (mechanical or structural), with similar awards and also subject to three prizes of $5,000, $7,000, and $10,000 each; processing, industry machinery, with 44 awards totaling $22,800; besides 223 prizes of $100 each to be paid for papers of merit in any classifications of participation which do not share in any other award.

MIDWEST

Monsanto Expanding

Monsanto Chemical Co., St. Louis, Mo., through President Edgar M. Queeny has announced an agreement with Australian interests, which are providing all the necessary capital in return for Monsanto's contributions in research information, plant design, and production experience, to form Monsanto Chemicals (Australia) Proprietary, Ltd., to manufacture Monsanto products in that Commonwealth. The new enterprise will permit the St. Louis company to serve the market now developing in Australia and will help protect part of the export field served by Monsanto Chemicals, Ltd., British subsidiary, before the war.

John C. Brooks, Monsanto vice president and general manager of the Plastics Division, has announced the building of a new plant in Springfield, Mass., for the manufacture of Resinox phenolic plastic molding materials, to replace the factory at Edgewater, N. J. This move will give Monsanto greater facilities to handle increasing demand and will thus bring all Monsanto plastics manufacturing activities to Springfield, where also space is available in the new research laboratory for Resinox research activities. The Resinox plant is expected to begin operations early next year.

Wishnick-Tumpeer, Inc., manufacturer and exporter of chemicals, oils, and

Witco Executives and Sales Staff Celebrating the Firm's Twentieth Anniversary at the National Sales Convention in Chicago

pigments, 295 Madison Ave., New York, N. Y., celebrated its twentieth birthday at its national sales convention held May 3 and 4 at the Hotel Congress, Chicago, Ill., attended by all officers and executives of the company, including heads of the operating and technical staff. Several papers were presented on the company's products. Tours were made of the new Witco research and development laboratory and the new asphalt plant.

Titanium Pigment Corp., 111 Broadway, New York, N. Y., effective June 1, moved its western sales office from St. Louis, Mo., to 104 S. Michigan Ave., Chicago, Ill.

Sunlite Mfg. Co., Milwaukee, Wis., which has a contract with The B. F. Goodrich Co., Akron, O., for rights on the korosealing process on luncheon cloths and ironing pads, has been compelled because of booming sales to move to larger quarters, according to Vice President Alva Smith. The new two-story factory building has a total of 20,000 square feet of modern manufacturing space with new machinery and equipment to speed up production. The koroseal ironing pad is said to be developed on a scientific principle which reduces ironing time 20 to 25%. Unlike conventional ironing pads which absorb moisture from the dampened clothes and thus retard the drying process, the koroseal pad not only remains dry because of its coating, but also has been given heat reflecting qualities by the addition of a special type of aluminum powder to the koroseal coating.

Simplex Wire & Cable Co., 79 Sidney St., Cambridge, Mass., announced that Henry A. Morss, Jr., since February a vice president of the company, recently was made factory manager, taking over the entire duties of the late C. R. Boggs. At the same time President Everett Morss stated Dr. John T. Blake had been appointed director of research.

CANADA

Canadian Seiberling Head

Richard James Thomas, elected in February, 1940, president, treasurer, and a director of the Seiberling Rubber Co. of Canada, Ltd., Toronto, Ont., was born in Maynard, O., on September 29, 1893. After graduation from high school in Harrisville, O., in June, 1910, he went to work for Babcock & Wilcox, Barberton, O. Then followed employment with the Firestone Tire & Rubber Co., Akron, O., and with the Portage Rubber Co., Barberton.

In 1922, Mr. Thomas joined the Seiberling Rubber Co., Akron, as cashier

Blank & Stoller, Ltd.

Richard J. Thomas

and then engaged in cost accounting and credit work. When Seiberling in March, 1927, purchased the business of K. & S. Tire & Rubber Goods, Ltd., Toronto, to organize the Seiberling Rubber Co. of Canada, Ltd., Mr. Thomas became the new concern's secretary-treasurer as well as a director. In March, 1933, he was made vice president and general manager.

He is a thirty-second degree Mason and also belongs to the Toronto Board of Trade and the Mississauga Golf Club. Mr. Thomas is interested in all sports.

Married, with one son, he lives at 67 The Kingsway, Toronto.

Tire manufacturers in the Dominion report sales for the first quarter of 1940 well ahead of those in the corresponding period last year.

Dominion Rubber Co., Ltd., which has controlled The Canadian Consolidated Felt Co., Ltd., both of Montreal, P. Q., through stock ownership, by approval voted at a special meeting of the latter concern on May 8 will purchase the assets and assume the liabilities of Consolidated Felt. Dominion Rubber's offer is to pay Consolidated Felt $50,000 cash, to release it from its indebtedness to Dominion Rubber, amounting to $198,000, to assume the Felt company bank indebtedness and other current liabilities, and to assume its obligations to employes under retirement, pension, and savings plan. The Consolidated Felt meeting also authorized its directors to wind up the affairs of the company and surrender its charter.

Annual Meeting of A.S.T.M.

(*Continued from page* 59)

ing, June 28, at 9.30 a.m.

At a recent meeting of the Executive Committee of the A.S.T.M., favorable action was taken on the request of Committee D-11 that its scope be expanded to include rubber-like materials. This expanded scope will cover certain other rubber-like materials which are coming into use in addition to those now being used extensively by the rubber industry.

S. C. I. Elects

THE American Section of the Society of Chemical Industry, 305 Washington St., Brooklyn, N. Y., has elected the following officers for the year 1940-41: chairman, Lincoln T. Work; vice chairman, Foster Dee Snell; honorary secretary, Cyril S. Kimball; and honorary treasurer, J. W. H. Randall. The following committee members were elected to succeed those retiring: W. P. Cohoe, W. A. Gibbons, W. J. Baeza, J. G. Detwiler, S. D. Kirkpatrick.

Canadian Rubber Section

THE Rubber Section, Canadian Chemical Association, held its final meeting of the 1939-40 season on April 26 at Walper House, Kitchener, Ont., with 40 members and guests in attendance. L. D. Carver (Dunlop) was elected chairman for the 1940-41 season, and R. B. Symons (Canada Wire & Cable) was elected secretary-treasurer. B. M. Costello (Canadian Goodrich) was appointed to the program committee to serve with T. Batty (Firestone) and J. C. Howard (Kaufman Rubber), who were on the committee last year.

S. D. Frost, of North American Cyanamid Co., spoke on the occurrence and production of limestone in the Thames River valley section of Ontario. Also on the program were colored movies on camping and fishing shown by Mr. Howard.

OBITUARY

Edward A. Pope

EDWARD ARNOLD POPE, vice president of The Cleveland Liner & Mfg. Co., Cleveland, O., died on May 11 of coronary occlusion. Born in Cleveland, April 18, 1890, he was an alumnus of Culver Military Academy and a member of Masonic orders.

Funeral services and burial took place in Cleveland on May 14.

Survivors include the deceased's father, F. Alton Pope, and a brother, Ervin C. Pope, both of whom are executives of The Cleveland Liner & Mfg. Co.

L. C. Rockhill

AFTER a three-day seige of pneumonia L. C. Rockhill, former Goodyear and Goodrich sales executive, died in Akron, O., on April 22. Born

in Canton, O., October 19, 1884, he attended Canton High School and Mt. Union College. After graduating, in 1906, he went to work for the *Cleveland Press*.

In 1907, however, he joined the Goodyear Tire & Rubber Co., Akron, and was placed in charge of the tire repair department. He then served, successively, as assistant manager of the automobile tire department, manager of the aeronautics department, of the automobile tire department (1914-1917), of the merchandising department, and as sales manager (1919-1927). In 1921, Mr. Rockhill was named to the Goodyear board.

On January 1, 1928, he became general sales manager of the Miller Rubber Co. of New York, Akron, and later was named a director and vice president in charge of sales. When Miller was merged with The B. F. Goodrich Co., Akron, in 1930, the deceased was kept on as merchandising counsel. But he resigned on December 31, 1932, because of ill health and retired to his farm in Hartville, O.

He was a charter member of the American Society of Sales Executives and also belonged to the Masons, American Management Association, Sigma Nu, and various golf clubs.

He leaves his wife, two daughters, and a son.

The funeral was held on April 25 in Hartville.

Harry A. MacKusick

HARRY A. MACKUSICK, 63, who resigned on January 1 because of ill health after a quarter-century as sales manager of The Philadelphia Rubber Works Co., Akron, O., died on May 13 in the Berea, O., hospital from injuries received in an automobile accident May 10. Mr. MacKusick went to Akron in 1900 after two years with the Boston Woven Hose & Rubber Co., Cambridge, Mass., and became assistant to the late A. H. Marks, then vice president of the Diamond Rubber Co. After seven years there in costing and compounding he went to California. Seven years later, however, the deceased returned to Akron to join Philadelphia Rubber Works.

Funeral services and interment took place in Akron.

Mrs. MacKusick, injured in the same accident, recently still was reported in a serious condition in the Berea hospital.

Wm. A. Kennedy

A HEART attack caused the death, on April 9, of William A. Kennedy former sales manager of Reichard-Coulston, Inc., manufacturer and importer of dry colors, 95 Madison Ave., New York, N. Y. Born in New York 43 years ago, he was educated in local schools and Fordham Prep. In 1914, Mr. Kennedy joined the sales laboratory of F. A. Reichard, Inc., but became an ensign in the United States Navy in 1917. Two years later he returned to the sales force of the Reichard concern, which had merged with J. W. Coulston & Co. The deceased became sales manager in 1925. Ill health forced him on the inactive list in 1937, and he retired last year.

M. Bergougnan

FROM Paris comes word of the death on February 25 of Mathieu Bergougnan, 78, a prominent figure in French industrial circles and head of Société Générale des Etablissements Bergougnan, Clermont-Ferrand, manufacturer of tires and mechanical rubber goods.

FINANCIAL

Unless otherwise stated, the results of operations of the following companies are after deductions for operating expenses, normal federal income taxes, depreciation, and other charges, but before provision for federal surtax on undistributed earnings. Most of the figures are subject to final adjustments.

American Chicle Co., Long Island City, N. Y. March quarter: net profit, $910,932, equal to $2.09 each on 436,400 capital shares, against $866,366, or $1.98 each on 437,300 shares last year.

American Cyanamid Co., New York, N. Y., and subsidiaries. March quarter: consolidated profit, $1,675,602 after depletion, depreciation, research and development expenses, interest, income taxes, and other charges, equal, after preferred dividend requirements, to 62¢ a share on 2,618,368 common shares, against $1,040,478, or 39¢ a common share, in the first quarter of 1939. (The net income does not include the equity in the undistributed net income of associated companies, 50% owned or less.)

American Zinc, Lead & Smelting Co., Columbus, O., and wholly owned subsidiaries. Year ended March 31: net profit, $354,463, equal, after dividend requirements on 67,953 shares of $5 prior preferred and 510 shares of $6 preferred stocks outstanding, to 2¢ each on 673,088 shares of common stock, against net loss of $21,552 in the preceding 12 months; net sales, $11,100,499, against $7,908,310. March quarter: net profit, $79,600, against $44,769 last year; net sales, $2,416,028, against $1,855,577.

Anaconda Wire & Cable Co., New York, N. Y. March quarter: net profit, $129,280, equal to 31¢ each on 421,981 common shares, against net loss of $77,161 last year.

Baldwin Locomotive Works, Philadelphia, Pa., and subsidiaries. Year ended March 31: consolidated net profit, $1,414,289, against net loss of $1,465,780 in the preceding fiscal year; consolidated sales, $37,030,781, against $28,256,888.

Baldwin Rubber Co., Pontiac, Mich. March quarter: net profit, $109,875, after depreciation, interest, federal income taxes, etc., equal to 35¢ a share on 316,757 shares of $1 par capital stock outstanding, against $120,787, or 38¢ a share, in the March, 1939, quarter, and $160,678, or 51¢ a share, in the December, 1939, quarter. Six months ended March 31: net profit, $270,553, or 86¢ a share, against $277,402, or 87¢ a share, in the preceding six months.

Barber Asphalt Corp., Barber, N. J. March quarter: net profit, $8,814, equal to 2¢ each on 390,223 capital shares, against net loss of $100,652 last year; twelve months to March 31: net profit, $653,518, or $1.67 each on 390,223 shares, against net loss of $318,204 for the year ended March 31, 1939.

Belden Mfg. Co., Chicago, Ill. March quarter: net income, $100,178, equal to 41¢ each on 241,547 shares, against $118,972, including $73,748 non-recurring income, equal to 49¢ a share, last year.

Brown Rubber Co., Inc., Lafayette, Ind. For 1939: net loss, $63,868, against one of $103,628 in 1938.

Brunswick-Balke-Collender Co., Chicago, Ill., and subsidiaries. March quarter: net profit, $118,226, equal to 18¢ a share on common stock outstanding after providing $34,717 for foreign exchange adjustments, against $135,199, or 21¢ a share, last year, when foreign exchange adjustments amounted to $5,006; net sales, $2,422,006, against $2,166,476 in the March quarter last year.

Collins & Aikman Corp., Philadelphia, Pa., and subsidiary. Fifty-three weeks ended March 2, 1940: consolidated net income, $2,556,895, equal, after preferred dividend payments, to $4.16 a common share, against $1,195,025, or $1.71 a share, for the previous fiscal year ended February 25, 1939.

Columbian Carbon Co., 41 E. 42nd St., New York, N. Y., and subsidiaries. First quarter, 1940: net profit, $1,018,639, after taxes and all charges and including $185,379 profit on sale of securities, equal to $1.90 each on the 537,406 shares of no-par value capital stock outstanding, against $829,878, or $1.54 a share, in the March quarter, 1939; current assets, $8,629,019; current liabilities, $1,489,299, against $6,728,792 and $1,005,850, respectively; $3,439,879 against $2,319,688.

Converse Rubber Co., Malden, Mass. Year to January 27: net income, $2,775,

equal to 16¢ each on 17,742 shares of $2 preferred stock, against net income of $11,074, or 62¢ a share, in the period April 2, 1938, to January 28, 1939.

Crown Cork & Seal Co., Inc., Baltimore, Md., and wholly owned domestic subsidiaries. For 1939: net profit, $1,956,048, equal, after dividends on preferred stock, to $2.80 each on 517,609 no-par common shares, against $1,213,227, or $1.37 each on 517,606 common shares, in 1938. March quarter, 1940: net profit, subject to audit, $402,603, equal, after preferred dividends, to 53¢ a common share, against $191,556, or 13¢ a common share, the first quarter of 1939.

General Cable Corp., New York, N. Y. March quarter: net income, $727,425, equal, after dividend requirements on preferred and Class A stocks, to 32¢ each on 618,182 common shares, against net loss last year of $196,773.

General Electric Co., Schenectady, N. Y. For 1939: net income, $41,236,000, after $21,013,000 provision for taxes and all charges, equal to $1.43 each on 28,784,457 shares of common stock, against $27,729,329, or 96¢ a share in 1938; sales, $304,680,000, against $259,484,000; orders booked, $360,748,000, against $252,176,223; current assets, including $110,047,000 cash and marketable securities, $205,734,000, against $182,767,157, including $98,714,571 cash and marketable securities; current liabilities, $40,110,000, against $27,743,763; inventories after reserves, $74,645,000, against $68,517,634; accounts receivable after reserves, $22,021,000, against $16,801,000. March quarter, 1940: net profit, $11,951,450 after all charges, equal to 41¢ each on outstanding common shares, against $7,373,431, or 26¢ a share in the first quarter of 1939; sales billed, $85,949,194, against $68,537,269; incoming orders, $97,490,047, against $86,882,953.

General Motors Corp., Detroit, Mich. March quarter: consolidated net income, $67,028,461, after charges and taxes, equal, after preferred dividend requirements, to $1.50 each on the average of 43,165,410 common shares outstanding, against $53,177,928, or $1.18 each on the average of 42,942,863 shares outstanding in the first quarter last year; net sales, $458,150,556, against $367,768,303.

Hercules Powder Co., Wilmington, Del., and subsidiaries. March quarter: net profit, $1,742,573, after all charges including depreciation and federal taxes, equal, after allowance for preferred dividends, to $1.22 each on 1,316,710 shares of common stock, against $1.18 a share in the preceding quarter and $1,087,322, or 73¢ a share, in the first quarter of 1939.

Hewitt Rubber Corp., Buffalo, N. Y. March quarter: net earnings, $38,377, equal to 23¢ a share, against $41,573, or 25¢ a share, last year.

I. B. Kleinert Rubber Co., New York, N. Y., and subsidiaries. For 1939: net profit, $289,364, equal to $1.76 each on 164,645 shares of $10-par capital stock, excluding 25,355 shares in treasury, against $211,548, or $1.27 a share on 166,095 shares of capital stock, in 1938; current assets $2,312,098, current liabilities, $375,756, against $2,079,220 and $282,800, respectively, at the end of 1938.

Link-Belt Co., Chicago, Ill., and subsidiaries. March quarter: net profit, $423,956, equal, after dividend requirements on 6½% preferred stock, to 54¢ a share on 684,462 common shares, against $199,160, or 22¢ a share on 675,573 common shares last year. Year ended March 31: net profit, $1,957,855 after $61,231 unrealized loss arising from fluctuation of Canadian exchange rates, equal, after preferred dividends, to $2.56 a common share, against $1,071,111, or $1.27 a common share, for 12 months to March 31, 1939.

Monsanto Chemical Co., St. Louis, Mo., and domestic subsidiaries. March quarter: net operating income after all charges, $1,642,037, equal, after preferred dividend requirements and minority interest in an American subsidiary, to $1.23 a share on 1,241,694 common shares outstanding March 31, against $1,142,264, or 82¢ a share on 1,241,816 common shares outstanding on March 31, 1939.

New Jersey Zinc Co., New York, N. Y. March quarter: net profit, $1,765,112, including $107,344 proceeds from patents, equal to 90¢ each on 1,963,264 capital shares, against $1,076,266, including $162,913 proceeds from patents, or 55¢ a share, in the same quarter last year.

Okonite Co., Passaic, N. J. For 1939: net loss, $36,258, against $205,483 loss in 1938.

O'Sullivan Rubber Co., Inc., New York, N. Y. For 1939: net profit before taxes, $136,775, against $5,986 in 1938; after federal and state income taxes, final net profit for 1939, $109,485; current assets on December 31, 1939, $551,946; current liabilities, $271,988.

Phelps Dodge Corp., New York, N. Y. For 1939: consolidated net profit, $12,278,601, after charges, taxes, and depreciation, but before mine depletion, equal to $2.42 each on the 5,071,260 capital shares outstanding, against $8,656,824, or $1.71 a share, in 1938. March quarter, 1940: net income, $2,412,000 after all charges but mine depletion, equal to 48¢ a share, against 42¢ a share in the first quarter last year.

The Skelly Oil Co., Tulsa, Okla., and subsidiaries. March quarter: consolidated net income, $773,281 after depletion, depreciation, interest, provision for taxes, cancellation and write-offs of undeveloped oil and gas properties, and other charges, equal, after dividend requirements on the 6% preferred stock, to 68¢ each on 995,348 shares of common stock outstanding, against $239,080 or 14¢ a share, in the first quarter of 1939. Year ended March 31: consolidated net income, on the same basis, $2,894,984, equal, after preferred dividends, to $2.52 a common share, against $2,224,364, or $1.85 a share, for the preceding 12 months.

Rome Cable Corp., Rome, N. Y. Year to March 31: net profit, $283,813, after deducting reserve against future decline in copper, equal to $1.52 each on 189,830 shares of $5-par common stock, against $213,960, or $1.12 a share, in the preceding fiscal year.

Thermoid Co., Trenton, N. J. For 1939: net earnings, $659,076, equal, after provision for depreciation and other charges including $119,868, or $3 a share, on the outstanding convertible preferred, to 65¢ a common share, against net income of $19,952 in 1938; current assets, $2,856,710; current liabilities, $850,251. President F. E. Schluter reported 1939 earnings the largest since 1929. March quarter, 1940: net profit, subject to audit, $135,208, after interest and minority interest, equal, after quarterly preferred dividend requirements, to 22¢ each a common share, against $65,073, or 7¢ a common share, last year. Twelve months to March 31: net profit, $502,439, or 80¢ a common share, against $180,475, or 12¢ a share on common, for the year ended March 31, 1939.

United Carbon Co., Charleston, W. Va., and subsidiaries. March quarter: net profit, $495,184 after depletion and minority interest, equal to $1.24 each on 397,885 no par common shares, against $459,202, or $1.15 a share, last year.

United Shoe Machinery Corp., Boston, Mass. Year ended February 29: net income after taxes, $9,861,265.93, equal, after preferred dividends, to $4.12 a share on the common stock outstanding.

British United Shoe Machinery Co., Ltd., Leicester, England. For 1939: net income, £550,429, against £529,571 in 1938.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. For 1939: net income, $13,854,365, equal, after all charges including taxes and preferred dividends, to $5.24 each on 2,592,155 shares of common, against $9,052,773, or $3.38 a share, in 1938; orders, $214,239,044, against $149,662,776; net sales billed, $175,071,363, against $157,953,216; unfilled orders, $70,821,960, against $40,188,150; current assets, $118,546,088, and current liabilities $16,294,466, against $110,287,348 and $11,606,763, respectively. March quarter, 1940: net income, $4,041,429, after all charges, equal to $1.51 each on all shares outstanding, against $2,356,151, or 88¢ a share, in the March quarter, 1939; unfilled orders

$82,637,841, against $46,924,240; bookings, $65,250,169, against $50,120,832; sales billed, $51,448,038, against $41,291,981.

New Incorporations

The Alfa Rubber Corp., Providence, R. I. Capital $75,000, divided into 750 shares of common stock at $100 each. W. C. Warring, Jr., Warwick; B. Littlefield, Providence; and S. K. Rothfuss, Cranston, all in R. I. Manufacture rubberized fabrics.

The Clark Rubber Corp., 229 Larch Ave., Teaneck, N. J. Capital $50,000 preferred stock and $2,000 common stock. E. St. John, 314 Glenwood Ave., E. Orange, and A. N. Jordan, 229 Larch Ave., Teaneck, both in N. J., and E. Rooney, 616 W. 184th St., New York, N. Y. Manufacture all kinds of rubber goods.

Eastern Rubber Co., Inc., 528-530 McBridge Ave., Paterson, N. J. Capital $100,000. M. P. Coveler, 528 McBridge Ave., Paterson; and W. H. and R. Heil, both of Milford, both in N. J. Manufacture rubber cement and bands and various other rubber goods.

Hardman Rubber Co., Quincy, Mass. Capital 100 shares, no par value. A. Lowe, Winthrop, F. C. Hardman, Quincy, and V. B. Harris, Boston, all in Mass.

Mervelon, Inc., Pawtucket, R. I. Capital $50,000, consisting of 500 shares preferred stock at $100 each and 125 shares common stock, no par value. J. and F. Goodman, Pawtucket, and A. C. Lennon, Providence, both in R. I. Manufacture elastic yarns and fabrics.

Milex Corp., Grand St., Woodstown, N. J. Capital $100,000 preferred and 2,500 shares common stock, no par value. M. F. Torrence, W. Hart, and S. Compher, all of Woodstown, and N. L. Catton and A. Northam, both of Wilmington, Del. Manufacture and deal in all kinds of rubber products.

National Latex Products Corp., 89 Central Ave., E. Newark, N. J. Capital $12,500 Class A and $12,500 Class B. M. W. and A. Morin, both of 89 Central Ave., and R. Abrams, 30 Journal Sq., Jersey City, N. J. Manufacture latex rubber products.

FROM OUR COLUMNS

50 Years Ago—June 1890

The day is probably not far distant when Mexico and Central America will have rubber forests covering them, under cultivation. (p. 189)

There are some 16 concerns in the United States manufacturing mechanical rubber goods. (p. 190)

The longest rubber belts in existence, it is said, are the "twins" in use at the elevators of the Pennsylvania Railroad Co. in Jersey City, which were manufactured by the New York Belting & Packing Co. Rolled up each of these belts stands about nine feet high, is 2,600 feet long, and weighs about 12,000 pounds. (p. 193)

In rubber shoe factories, what is known as the "yellow cement," is, as a rule, made of the best of Para with a little litharge and enough sulphur to insure its curing when the goods are in the heater. (p. 204)

The United States ranks first among all countries in the world in the consumption of India rubber. Beginning with 1885 the relative position of Great Britain and the United States was changed, the latter country taking the lead in imports. (p. 211)

25 Years Ago—June 1915

The last of the American honorary members of the Rubber Club of America passed away in May. John P. Rider and John D. Vermeule, both veterans in the rubber business, both successful, both dating back to the days of Charles Goodyear have gone to the Great Beyond. (p. 477)

A great deal of work has been done and money spent in the endeavor to produce plastics having a basis of casein. (p. 484)

R. Ditmar reports the successful use of organic coloring agents in the manufacture of colored rubber goods. (p. 493)

Reclaimed rubber is adapted for impregnating fabrics by reduction to emulsions with solvent and water. (p. 493)

An English patent consists of acceleration by the addition of p-nitrosodimethylaniline or its homologues. (p. 494)

The work of F. Ripeau confirms the view that the high quality of Brazilian hard cure Para is due to coagulation by the carbon dioxide present in the smoke employed. (p. 494)

The secret of the noiseless street car is a perfected type of running gear, duplex wheels, one revolving within the other and separated by thick bands of rubber, supporting the wheels. (p. 510)

A French scientist, M. Bertrand, states that when rubber becomes "tacky" it is due to a molecular transformation. (p. 520)

MEXICO

Four companies are now reported to be manufacturing automobile tires and tubes in Mexico: Compania Hulera "Buzkudi," S.A., Compania Hulera "El Popo," S.A., Compania Hulera "Oxo," S.A., and Compania Hulera Mexicana, S.A. Judging by official statistics, their output has fluctuated considerably since 1936, when output was 166,000 tires and 123,000 tubes; in 1937, 206,000 tires and 156,000 tubes; 1938, 192,000 tires and 113,000 tubes; 1939, 190,000 tires and 150,000 tubes. Production in the last half of 1939 dropped about 10% as compared with the first half of the year. However there seems to be a possibility that output during 1940 will again be increased.

During the first ten months of 1939, Mexico imported 200,263 kilos of pneumatic casings of over 10 kilos each and 28,595 kilos of pneumatic casings up to 10 kilos each, besides 12,898 kilos of inner tubes. About 85% of the tires and 80% of the tubes were supplied by the United States.

JAPAN

Japanese rubber manufacturers have been worried about crude rubber supplies from Malaya. Soon after the outbreak of the war Singapore began to license exports of commodities including crude rubber, and exports to certain neutral countries were subject to the closest scrutiny; in several cases guarantees against reexport were required; while shipments to such countries were based on exports of preceding periods after deduction of reexports made in those periods. Japan was one of the countries to which exports were strictly controlled. According to the *Japan Chronicle*, however, it was expected that this control would be relaxed for the first quarter of 1940, to the extent that no reexport guarantees would be required; but shipments, it was understood, would be limited to the amount of rubber exported to Japan in the same period of the preceding year.

In 1939, total rubber shipments from Malaya to Japan came to 33,000 tons.

Because they are unable to purchase tires, bicycle dealers in Japan are said to have more than 200,000 new bicycles unsold on their racks.

SOUTH AFRICA

Rubber industry statistics from South Africa indicate growing activity in this business of late. Imports of crude rubber in 1939 were 9,765 long tons, against 5,549 tons in 1938. Tire imports fell to 4,032,135 pounds from 5,031,446 pounds in 1938.

EUROPE

GERMANY

Silent Electrical Discharges on Rubber Solutions

In Germany attempts are being made to overcome some of the difficulties due to heat generation in motor vehicle tires by developing new rubbers with greater heat resistance than that of normal natural rubber or synthetic rubber. In this connection L. Hock and H. Leber[1] have investigated the action of silent electrical discharges on solutions of natural rubber and of Buna.

The polymerization of fatty oils by means of electrical discharges has been known for some time. In 1928, Fromandi also tried the effect of electrical treatment on solutions of natural rubber and synthetic isoprene rubber; but since the hydrogen he used in the process was not perfectly free from oxygen (it had not yet been discovered that even the slightest trace of oxygen affects the molecule size of rubber), he failed to obtain the desired result. He had observed, however, that with synthetic rubber, electrical treatment did apparently at first increase the size of the molecule while at the same time there was an increase in the viscosity of the solution (as in polymerized oils), but the process was soon reversed, and decomposition followed. Nevertheless these findings were sufficiently encouraging to lead to further research work in this direction.

In the present investigation by Hock and Leber care was taken to use hydrogen gas completely oxygen-free, and polymerization was duly achieved. The tests were conducted with benzol solutions of natural crepe rubber and of Buna 85. Polymerization by electrical means was continued beyond the point of increasing viscosity of the solution to the stage where gel-like flakes separated. After purification and drying, these flakes were found to be an insoluble form of rubber, soft and crumbly, non-elastic and non-plastic; the structure showed three-dimensional reticulation. When polymerization was not carried to this extreme, and the polymerizates consequently still retained their solubility, products resulted having the elasticity and plasticity of the original rubber and technologically also behaved like raw rubber.

A procedure was developed for both the natural rubber and the Buna by which various degrees of polymerization could be obtained electrically, the fractions separated, and their properties determined (iodine number, softening temperature, and combustion heat). It was found that with increased polymerization the iodine number and combustion heat decreased, and softening temperature was raised.

As only small amounts of the polymerizates were available, systematic serial tests could not be undertaken to determine the most suitable fillers and vulcanizing agents for the new rubbers. But a certain number of parallel tests comparing normal natural tread compounds with corresponding mixes made from electrically treated natural rubber and Buna 85 were made which gave some idea of the technological behavior of these products and indicated that the electrical treatment had improved certain properties. Thus mixes of electrically treated Buna 85 were markedly superior to those of the original Buna 85 with regard to tensile strength and elongation and in these respects were noticeably closer to unchanged natural rubber than the original Buna 85.

These results give some indication of the way in which electrical polymerization affects the properties of vulcanizates and appear promising. It is expected that when further experimentation on much larger quantities of the new rubbers than have so far been available has led to perfection of the polymerization process and to the development of a suitable compounding technique, a greater degree of success will be obtained.

[1] "The Action of Silent Electrical Discharges on Rubber Solutions." *Kolloid-Z.*, Jan., 1940, pp. 65-77.

Developments in 1939

Although no exact figures are available on the amount of Buna rubber produced in 1939, it is quite evident that production increased. The first commercial factory at Schkopau is said to have a capacity of 25,000 tons annually, and a second Buna factory at Huls, to be as large as the Schkopau works, is under construction and should begin operations this year.

During 1939 the capital of the Buna G.m.b.H. was raised from 30,000,000 to 50,000,000 marks.

The cost of Buna was lowered and is reported to be around three marks per kilo, and its increased use in 1940 was planned. Before the war most of the so-called Buna tires contained about 30% of natural rubber; the Buna was used entirely in the tread. But this year all passenger car tires are to be exclusively of Buna.

After long experimentation with an ethylene polysulphide synthetic rubber, production began last year. This rubber is intended for flexible tubing and conduits of gasoline, benzol, etc., for packing, printing plates and rollers, and, instead of lead, for sheathing cables.

It seems that experiments in making gas black have progressed to the stage where Germany may soon be supplying domestic gas black to her tire industry. Headway was also reported in the production of elemental sulphur from gases of hydrogenation and coke-oven plants. In 1937 output was estimated at 70,000 metric tons of elemental sulphur against requirements of 110,000 tons; for 1939 it was planned to produce 100,000 tons and over 180,000 tons in 1940.

GREAT BRITAIN

Rubber Export Group Formed

In quick response to the invitation of the Export Council recently formed by the government, the rubber manufacturing industry has now constituted a Rubber Export Group including the following representatives of the industry: Sir Walrond Sinclair, chairman I.R.M.A., and British Tire and Rubber Co., Ltd.; J. L. Graham, director, overseas sales, Dunlop Rubber Co., Ltd.; R. G. Soothill, director, Turner Bros. Asbestos Co., Ltd.; T. J. Cragg (J. Mandleberg & Co., Ltd.), chairman, Rubber Proofers' Association; R. W. Lunn, director, Leyland & Birmingham Rubber Co., Ltd.; John Cunningham, managing director, Phillips' Patents, Ltd.; Reginald Moseley, director, David Moseley & Sons, Ltd.; S. T. Rowe, I.R.M.A., Manchester Section, and Greengate & Irwell Rubber Co., Ltd.; L. V. Kenward, director, Dunlop rubber products group; Thos. H. Hewlett, chairman and managing director, Anchor Chemical Co., Ltd.; C. T. Mabey, director, Wm. Warne & Co., Ltd.; H. W. Franklin, managing director, J. G. Franklin & Sons, Ltd.; Alexander Johnston, managing director, North British Rubber Co., Ltd.; Mark Pooles (Lewis & Peat), chairman, Rubber Trade Association of London; and F. R. Green, chairman, Electric Hose & Rubber Co., Ltd. Because of the great variety of products of the rubber manufacturing industry, it is further planned to form Sectional Groups.

Guard Ring for Twin Tires

Henley's Tire & Rubber Co., Ltd., Springfield House, Westcott, near Dorking, is marketing a twin-tire guard designed to prevent stones from lodging between the tires. It consists of a hollow, flexible rubber ring of wedge-shaped section, with sides curved to conform to the contour of the tires, and it completely fills the space between the tires. A constant circulation of cool air is provided by means of pockets in the flanks of the ring which communicate by ducts with the outer air and by other openings, with the hollow core of the ring. An additional advantage claimed for the guard is that it prevents the tires from sinking in soft gound.

Safety Suit

Seamen forced into the water as a result of enemy action, frequently suffer severely from exposure to cold, and in the past many deaths have resulted. Recently a protective rubber suit, which it is claimed will keep the wearer warm and afloat for a considerable time, was demonstrated at the offices of the Officers (Merchant Navy) Federation. The garment, of strong flexible rubber, is the invention of a Norwegian engineer and somewhat resembles a diver's suit.

It is made with light-weight rubber sea boots and a hood attached. Elastic bands at the wrists and a cord at the neck are provided to insure adequate tightness at these points. In a four-hour test, when every effort was made by the wearer to get water into the suit, only half a pint of water penetrated. The suit is intended to be slipped on over the life-saving waistcoat (now in general use) when the order is given to abandon ship. It was shown that a man can, without undue haste, get into the suit, put on the hood, and tie the cord at the neck in 30 seconds.

Colwyn Gold Medal Award

The Council of the Institution of the Rubber Industry announced a dual award of the Colwyn Gold Medal for 1940, to two well-known rubber chemists, Dr. P. Schidrowitz and Dr. H. P. Stevens. The I.R.I. president was expected to present the medals at the annual general meeting and dinner scheduled in London on May 22.

Dunlop Rubber Co. Report

Dunlop Rubber Co., Ltd., at its annual meeting announced that last year was one of the most satisfactory trading years enjoyed for some time. Had it not been for the outbreak of the war, results would have been still better, the chairman, Sir George Beharrel, stated. With very few exceptions, demand for the company's products was good both at home and abroad, and prices were remunerative. The plantations benefited from the rise in the price of crude rubber from an average of not quite 7¼d. per pound in 1938 to an average of 9d. in 1939. The 1939 results were due mainly to normal trade activities; only 7½% of the total turnover of the Dunlop group of companies for the year was due to government orders. Since the outbreak of the war, of course, the proportion of government business has increased markedly.

Net profit for the year was £2,853,000, against $1,501,000 in 1938. As the amount carried forward from the last account was £603,420, the total sum available for appropriation was £3,456,553. Out of this, £1,027,000 was provided for taxation; £386,109 in 1938. Besides £500,000 has been transferred to income tax reserve toward the 1940-41 liability. A dividend was proposed on the ordinary shares of 8% plus a bonus of 4%, together 12%, against 9% in 1938. The 1939 dividend is the highest since 1929 when 15% was paid. The sum of £630,875 was carried forward.

Named to Anglo-French Council

The chairman of Dunlop Rubber Co., Ltd., Sir George Beharrel, has been appointed a member of the Anglo-French Joint Industrial Council, set up by the Anglo-French Industrial Agreement developed from negotiations between the Federation of British Industries and the Confederation Generale du Patronat Francais. The agreement provides, among the rest, for pooling the resources of France and Great Britain, that materials which can be supplied by either of the two countries are as far as possible not to be imported from third countries, and that there is to be no competition between British and French in buying war materials.

FRANCE

In the latter part of 1938 the Institut Francais du Caoutchouc issued an article by M. Bocquet,[1] director of the technical department of the Soc. des Plantations des Terres Rouges, in which stress was placed upon the desirability for planters and manufacturers to standardize crude rubber. The Institut now presents an article by A. Thomas,[2] also of the above concern, in which the subject is elaborated and details are given of a program which the author considers should be started as soon as possible by manufacturers and producers in collaboration.

The program should comprise: (1) exact definition of tests for rubber on arrival, and standardization of these tests; (2) homogenization of qualities; (3) improvement of qualities.

M. Thomas points out, as many have done before him that while the present method of classifying crude rubber on the market by its appearance does guarantee the cleanliness of the product, it gives no indication whatever of its real value. He claims this method is at the bottom of the lack of uniformity of rubbers; it forces the planter to destroy some of the natural qualities of the latex in his effort to avoid the defects which, according to the existing classification, would disqualify his rubber.

While it is comparatively easy to avoid some defects (as black spots, tackiness, and processing and smoking defects) in the carefully run up-to-date factories, bubbles are very difficult to prevent. They result from fermentation within the latex itself or in the coagulum; this fermentation is produced in an irregular manner according to the origin of the latex, atmospheric conditions, and treatment. To avoid bubbles the planter constantly changes the proportion of anti-coagulant, acid, dilution of the latex at time of coagulation, temperature and ventilation during drying, and these changes are the basic cause of the heterogeneity of the rubber supplied to the market.

If bubbles were not considered defects in sheets, it would be possible to establish a fixed routine for preparation, and such variations as still occurred would be due only to differences found in the latex itself according to the type of trees, season, and atmospheric condition. The variations due to manufacture exceed 100%, but those due to the latex itself rarely exceed 10%, and even this amount of variation could probably be reduced by taking into account the special composition of each latex when it is treated.

Inquiries among manufacturers appear to indicate that they do not consider that the presence of bubbles in sheet necessarily constitutes a defect. On the face of it, therefore, the problem seems very simple to solve: rubber brokers have only to stop penalizing for bubbles, and then planters would automatically supply a uniform and eventually, an improved product. In reality, of course, the matter is not quite so simple; if the existing method of judging is discarded, a new one to take its place must be devised. Mr. Thomas suggests the universal adoption by manufacturers and planters of tests and analyses similar to those worked out by the Crude Rubber Committee of the American Chemical Society.

In outline, the complete test would comprise: physical tests to cover plasticity, tensile on vulcanized compound, hardness, and artificial aging; and the chemical analyses to include determination of % of moisture, water extraction, acetone extraction, determination of protein substances, and determination of ash, with investigation of Fe, Mn, Cu, lime, potash, and phosphoric acid. After the tests were codified and accepted by all manufacturers and planters, control laboratories in the producing countries could be established which would be attached to the rubber sections of recognized local institutions. Then the planter could easily control preparation; while it would be possible for the manufacturer to specify exactly the type of uniform product he required.

Once the problem of uniformity of quality was solved, it would be much easier to take up the final task, improving qualities. The planter now having at his disposal exact means of comparing and testing different rubbers would study all the possibilities of varying the characteristics of the rubbers and thus be prepared for new demands by the manufacturers.

[1] Rev. gén. caoutchouc, 15, 326 (1938).
[2] Contribution to the Study of the Homogenization of Raw Rubber." *Ibid.*, 16, 5 (1939).

LATVIA

Over the three years 1936, 1937, and 1938, Latvia's imports of rubber manufactures gained steadily: in 1936, 148,556 kilos, value, 519,962 lats; 1937, 270,259 kilos, value, 1,200,778 lats; 1938, 324,941 kilos, value, 1,384,560 lats. The chief imports were tires and tubes for motor vehicles, and in 1938 tire imports totaled 267,860 kilos, value, 970,490 lats; while tube imports were 23,137 kilos, value, 89,792 lats. By far the greater part of the tires and tubes came from Great Britain. The main exports are footwear of all kinds, with total value in 1938 at 1,180,000 lats.

FAR EAST

MALAYA

Research Agencies Cooperate

To further the scheme for cooperation between rubber research institutions in the main rubber producing centers in the East, a unique conference of directors of three such organizations in Netherland India and one each in Malaya and Ceylon recently took place at Kuala Lumpur. Those participating were: Dr. Th. G. E. Hoedt, director of the West Java Experiment Station, Buitenzorg, representing the Central Association of Experiment Stations in Netherland India; Dr. A. d'Angremond, director of the General Experiment Station of the A.V.R.O.S., Medan, Sumatra; Dr. G. M. Kraay, director of the Department of Rubber Research of the West Java Experiment Station; T. E. H. O'Brien, director of the Rubber Research Scheme of Ceylon; H. J. Page, Director of the Rubber Research Institute of Malaya. The conference was of an orientating character and included an active exchange of views on various matters. Among the questions discussed, which will receive further consideration, were the possibility of exchanging planting material among the different countries and the standardization of methods of analyzing latex in the producing countries. It was decided to hold similar conferences every year, the next one to take place at Buitenzorg, Java, when it is hoped the French rubber producing industry will also be represented. By that time it is expected the Indo-China rubber experiment station, now under construction at Saigon, will have opened.

Chermang Development

Chermang Development, Ltd., formed ten years ago with capital provided by a few rubber companies to grow rubber on up-to-date lines, using high-yielding material, is about to reach the dividend-bearing stage, it was revealed at the annual general meeting. The company earned a net profit of $37,970 (Straits currency) in 1939, and if prices remain at a reasonable level and the exportable allowance is not drastically cut, it is expected to turn out a dividend in 1940, the first after 11 years.

Production on a full commercial scale was begun for the first time in 1939. The area in tapping increased from 582 acres (out of a total mature area of 1,040 acres) at the beginning of the year, to 888 acres toward the close. The age of the trees was seven and eight years, counting from the date of budding. While the accepted age for commercial tapping of budded trees is six years, Chermang adopted a cautious policy, and apart from test tapping to obtain information as to the behavior of the trees, tapping was delayed until the trees had attained a greater girth than the accepted minimum. It is hoped that by following this course better results will be obtained in the long run.

The average yield of the tapped area, which included a variety of clones, worked out at 553 pounds per acre per annum, at the beginning of the year, but rose to 769 pounds by the end of the year; the average for the whole year was 597 pounds. Striking yields were obtained from some of the clones: the four clones, PB.186, Tj.1, BB86, and Glenshiel 1, each gave over 1,000 pounds per acre per annum; Clone Tj.1 actually produced at the rate of over 1,500 pounds per acre per annum during December, and Glenshiel 1 yielded at a rate of 1,430 pounds in the same month. The latter output is the more remarkable as it was obtained on third daily tapping instead of alternate daily tapping, the method adopted for all the other trees. Other good clones produced at the rate of 750 pounds per acre per annum in December. Some clones are still backward, but even they yielded at rates comparing favorably with the best that could have been obtained from seedling rubber, and these clones are expected to improve greatly later.

Bark renewal is reported satisfactory in all clones, and no trouble arose from bark or stem disease. The estate is said to be exceptionally free from root disease; attention is called to the fact that the incidence of root disease is lowest in the fields where the minimum of jungle clearing took place and "crowbar" planting was adopted instead of the usual holing.

Wilkinson Process Rubber Co.

Wilkinson Process Rubber Co., Ltd., which has a factory and estate in Malaya and subsidiaries and agencies in England, Canada, South Africa, and Australia, manufactures Linatex sheet used for various purposes in engineering, mining, by railways, and, more recently, in aircraft construction. It is in the latter field, and especially since the outbreak of the war, that the company reports considerably increased application of Linatex. Indeed the demand for it for aircraft in England has grown so that the London subsidiary has had to establish a second factory near London. Large sales of Iinatex for the same purpose are expected in Canada also and in Australia as airplane manufacture progresses. Since the war the company in South Africa has been flooded with orders for Linatex; the Linatex-Spargo pumps, recently introduced here, have been selling well also. The demand for these pumps has also been great in England and Canada so that it is planned to manufacture them in these two countries.

The company booked net profits of $99,544 (Straits currency) for 1939 and total dividends of 10%.

NETHERLAND INDIA

Latex for Roads

At the time the VIII International Road Congress (the Hague, June, 1938) was held, an advisory report was presented on the use of rubber in road construction, with special reference to the use of rubber for this purpose in Netherland India. In connection with the experimental work on latex-cement mixtures for this report, an investigation was made of the aging properties under atmospheric influences of latex rubber films containing vulcanization ingredients. A paper by G. J. van der Bie gives details regarding this investigation. A large number of variously compounded latex mixes were prepared, and films made from these mixes were exposed to atmospheric influences for at least six months. The effect of the different types of accelerator, antioxidant, thickener, and disperser employed, and the quantity of sulphur as well as the kind of latex, was studied, the best method of dispersing having been determined previously. It was found that films containing vulcanizing ingredients show a tendency to crack on drying, which can largely be avoided by using casein as a disperser, although even then cracks may appear if latekoll (a thickener) is added.

The results of the mechanical and chemical tests led to the following conclusions: There is a difference between field latex and latex cream, the latter perhaps being preferable. In the selection of accelerators, under tropical conditions, for practical reasons preference should be given to Vulcacit P extra N, mercaptobenzothiazol, or Vulcafor S.D.C., or combinations of these. Comparatively favorable aging, even without an antioxidant, is obtainable by using at least four parts of sulphur to 100 parts of rubber. AgeRite Resin is to be preferred as an antioxidant. In general, no harmful effects result from the use of sodium silicate as a thickening agent in latex compounds without fillers. In testing the rubber films after aging, besides the stress-strain properties only the amounts of free and total sulphur need be determined.

Rubber Exports

The Central Bureau of Statistics reports that in February, 1940, Java and Madura shipped 7,465,061 kilos of rubber, including 17,877 kilos latex and 78,543 kilos in the form of manufactures. Estates in the Outer Provinces exported 14,203,347 kilos, including 1,735,742 kilos latex. Natives in the Outer Provinces sent 16,974,851 kilos of rubber. The total for all Netherland India was 38,643,259 kilos.

Editor's Book Table

BOOK REVIEWS

"Plastics in Engineering." J. Delmonte. Published by Penton Publishing Co., Cleveland, O. 1940. Cloth, 6 by 9 inches, 620 pages. Index. Price $7.50.

The fast-growing plastics industry has placed many new materials at the disposal of the engineering designer. By discussing the properties of plastics and presenting numerous applications to machine design problems, this work is aimed at assisting the engineer engaged in this field. A thorough analysis is made of molding problems and mold designs; laminating, casting, and extruding are treated in the like manner. Engineering data are conveniently tabulated and classified for easy reference. While the advantages of plastics are emphasized, the author does not neglect to mention their shortcomings. Space has also been devoted to the chemistry of plastic materials, as such a background is held to be essential to the correct scientific analysis of problems arising in the molding of materials and their behavior in service. Recognition of the importance of organic plastics in surface coatings is given in a chapter devoted to this subject.

The author, contrary to many others in this field, recognizes many close relations between plastics and synthetic rubbers. Consequently a chapter has been written on synthetic rubbers and rubber-like resins, which reviews briefly neoprene, "Thiokol," the Bunas, and the rubber-like vinyl resins and discusses their properties and applications. In a chapter on laminated plastics mention is made of rubber and canvas-base laminated plastics in which the rubber is vulcanized at the same time that the resin is polymerized. Rubber manufacturers interested in organic plastics as a supplementary raw material should find much of value in this book, particularly in regards to the adaptation of their equipment and processes to the handling of plastics.

"Physical Constants of Hydrocarbons." Volume II. Cyclanes, Cyclenes, Cyclynes, and Other Alicyclic Hydrocarbons. Gustav Egloff. American Chemical Society Monograph Series. No. 78. Published by Reinhold Publishing Corp., 330 W. 42nd St., New York, N. Y. 1940. Cloth, 6 by 9 inches, 608 pages. Four-Volume Series. Price $12 for Volume II.

This book is the second of a four-volume work on the physical constants of pure hydrocarbons. The first volume, published in 1939, covered aliphatic compounds. The data, arranged in tabular form, include melting point, boiling point, specific gravity, index of refraction, and additional pertinent information.

"Hydrocarbon Chemistry. A General Discussion." Reprinted from *Transactions of Faraday Society*, Vol. 35, Part 8, August, 1939. Published by Gurney & Jackson, 98 Great Russell St., London, England. Cloth, 6 by 9⅝ inches, 286 pages. Price 12s. 6d. Postage 1s. extra.

This volume comprises the papers on hydrocarbon chemistry, together with discussions thereon, presented at the Seventieth General Discussion of the Faraday Society, held at the Imperial College of Science, London, England, April 17 to 19, 1939. The subject matter is divided into four parts: homogeneous thermal reaction of hydrocarbons; catalytic reactions of hydrocarbons; the mechanism of the technical synthesis and transformation of hydrocarbons; and olefine polymerization. In this last part considerable attention is given to the mechanism of polymerization. Results of an ozonolysis of a butadiene polymer show that in aqueous emulsion butadiene polymerizes with all the possible additive mechanisms taking place and that the polymer consists of a highly complex mixture in which the main carbon chains vary in their degree of unsaturation, number, and disposition of vinyl side chains, and in the extent of chain branching. It is further demonstrated that a copolymer of equimolecular quantities of butadiene and methyl methacrylate is composed chiefly of alternate units of butadiene and methyl methacrylate. The book, containing much data, represents a valuable contribution to the chemistry of hydrocarbons.

"Proceedings of the Forty-Second Annual Meeting. Volume 39. Committee Reports—Technical Papers." Published by the American Society for Testing Materials, 260 S. Broad St., Philadelphia, Pa. 1940. 6 by 9 inches, 1352 pages. Price $8.50, heavy paper; $9, cloth; $10, half-leather.

Under the A.S.T.M.'s new publication scheme, the society's "Proceedings" are issued for the first time in a single volume. It contains all committee reports and technical papers presented at the annual meetings held at Atlantic City, N. J., June 26-30, 1939. All new tentative standards (formerly published in the "Proceedings") are included in the "1939 Book of Standards."

"Federal Regulatory Action and Control." Frederick F. Blachly and Miriam E. Oatman. Published by The Brookings Institution, Washington, D. C. 1940. Cloth, 6 by 9 inches, 374 pages. Price $3.

This book deals with the vital problem of federal intervention in economic fields. First a thorough analysis of the existing system is presented. Recognizing that great improvement is possible in federal regulatory action and control, three conflicting proposals for modifying the present system are considered: (1) that except in the exercise of judicial powers, administrative regulatory agencies shall be placed in executive departments subject to the control of the President; (2) that the power of the courts over the regulatory agencies shall be materially increased; and (3) that the organization, procedures, and relations of the regulatory agencies as they have evolved over the past 50 years are basically sound and in accordance with the Constitution and its bill of rights, but should be perfected and simplified. The analysis leads the authors to support the third, or revisionist, plan.

"Foreign Commerce and Navigation of the United States for the Calendar Year 1938." United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Washington, D. C. 1940. Cloth, 9 by 11½ inches, 1014 pages. Indexed. Price $2.25. For sale by the Superintendent of Documents, Washington.

This annual report of the foreign commerce and navigation of the U. S. presents detailed statistical tables for 1938 on imports and exports by articles, countries, and customs districts. The book also contains summary tables which compare 1938 with previous years. Detailed figures on imports and exports of rubber and rubber manufacturers and the exports of rubber compounding materials are included.

NEW PUBLICATIONS

"Bristol's Wide-Strip Tachometers. Bulletin 542." The Bristol Co., Waterbury, Conn. 4 pages. Recording and indicating tachometers, of the electric-magneto type, for measuring speed of rotation and speed of travel are described in this illustrated bulletin.

"Meehanite Metal—Physical Specification Chart of Meehanite Castings for Engineering Purposes." Meehanité Research Institute of America, Inc., Pittsburgh, Pa. This circular chart reveals data on the various types of Meehanite castings available to industry. Properties given include: strength, hardness, machinability, friction quality, magnetic permeability, thermal conductivity, and specific gravity. In addition to general engineering castings, this chart also covers heat, corrosion, and wear resisting types.

"N. B. M. A. 1940 Data Book—Trucks, Buses, and Taxicabs." National Battery Manufacturers Association, Akron, O. Price 50¢. The association's 1940 data book covers general specifications for original battery installations in trucks, buses, and taxicabs. These data also serve as a guide to the size and electrical capacity of replacement units.

"Solvent Recovery by the Columbia Activated Carbon System." Carbide & Carbon Chemicals Corp., 30 E. 42nd St., New York, N. Y. 32 pages. The firm's solvent recovery process, which utilizes activated carbon from cocoanut shells, is described in this booklet. Information also includes cost, equipment, and applications. In the case of rubber solvent recovery, claims are made for high recovery efficiency, low cost, and automatic operation.

"Index to A.S.T.M. Standards, Including Tentative Standards." American Society for Testing Materials, 260 S. Broad St., Philadelphia, Pa. 152 pages. All of the society's 885 standards, as of January 1, 1940, are indexed in this booklet, which is designed to be of service to anyone wishing to ascertain whether the society has issued standards covering a particular engineering material or subject and to aid in finding standards in the volumes where they appear.

"Neoprene Type GN." Report No. 40-2. N. L. Catton, D. F. Fraser, and D. B. Forman. E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. 40 pages. This report deals with the newly introduced Neoprene Type GN, discussing its plasticization, processing, and compounding for specific properties. The various modifying agents, softeners, fillers, and reenforcing materials for use with the new product are also covered.

"1940 Baseball Dope-Book." General Atlas Carbon Co., 60 Wall St., New York, N. Y. 36 pages. Here is the baseball fan's reference book on facts concerning this sport. It contains records, results, and information from 1901 to date.

"The Vanderbilt News." May-June, 1940. R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. 20 pages. This issue of the *News* is given over entirely to a discussion of the ultra-rapid accelerator, Butyl Eight, and its use in curing rubber goods at room and elevated temperatures. Specific directions as to its use in naphtha cements and in dry rubber mixes are presented. Data are given which show: effect of retarders in a Butyl Eight compound, retarding effect of rubber substitutes, effect of fillers on curing rate, and aging of Butyl Eight compounds. Commercial compounds for hospital sheeting, white tubing, red sheet packing, and midsoling are included.

"Catalog Number 3." Pittsburgh Brass Mfg. Co., Pittsburgh, Pa. 40 pages. A wide range of bronze pipe fittings for rubber factories as well as blast furnaces and steel mills are presented in this catalog. The products include two- and three-way cocks, unions, elbows, tees, crosses, swing joints, and hose couplings and clamps. A special section is devoted to Roto-Flex ball pipe joints which are especially recommended for vulcanizers.

BIBLIOGRAPHY

HAZARDS WITH BUTADIENE AND ITS PEROXIDES. D. A. Scott, *Ind. Eng. Chem. (News Ed.)*, May 10, 1940, p. 404.

RECENT DEVELOPMENTS IN WATERPROOFING. C. E. Mullin, *Chem. Industries*, May, 1940, pp. 557-63.

NON-CORROSIVE, NON-METALLIC MATERIALS. *Rayon Textile Monthly*, May, 1940, pp. 85-87.

ACTION OF OZONE ON RUBBER. F. J. Norton, *Rubber Age (N. Y.)*, May, 1940, pp. 87-90.

AMERICA'S ONLY CRUDE RUBBER PLANTATION. H. M. Farkas, *Rubber Age (N. Y.)*, May, 1940, pp. 91-92.

ADVANCES IN LATEX TECHNOLOGY. III. R. J. Noble, *Rubber Age (N. Y.)*, May, 1940, pp. 93-98. (To be concluded.)

USES OF RUBBER THREADS IN TEXTILES. W. Davis, *Rubber Age (London)*, Apr., 1940, pp. 43-44.

LET US HAVE MORE BRANDED GOODS. C. Attwood, *Rubber Age (London)*, Apr., 1940, pp. 45, 50.

CENTRAL EUROPEAN RUBBER EXPORTS BRITAIN CAN CAPTURE. *Rubber Age (London)*, Apr., 1940, pp. 47-48, 53.

ONE HUNDRED YEARS OF RUBBER MANUFACTURE. The Progress of William Warne & Co., Ltd. *Rubber Age (London)*, Apr., 1940, pp. 51-52.

LINING TANKS WITH RUBBER. *Rubber Age (London)*, Apr., 1940, p. 53.

RUBBER IN THE SHIP. B. J. Habgood, *India Rubber J.*, Apr. 6, 1940, pp. 5-7, 10.

REPLANTING OF OLD RUBBER AREAS, AND ROOT DISEASE. H. Ashplant, *India Rubber J.*, Apr. 6, 1940, pp. 8-9.

COSTING IN RELATION TO FACTORY CONTROL AND ADMINISTRATION. F. C. Lawrence, *India Rubber J.*, Apr. 13, 1940, pp. 3-4; Apr. 20, pp. 3-6. (Conclusion.)

QUALITATIVE VARIATIONS OF RUBBER IN KOK-SAGHYZ ROOTS AT THE SECOND YEAR OF VEGETATION. S. M. Maschtakov, *Compt. rend. Acad. Sci., U. R. S. S.*, 24, 509-12 (1939).

MECHANISM OF HEVEA RUBBER LATEX COAGULATION. H. P. Stevens and F. J. Paton, *Chem. and Ind.*, 30 (1940).

CAUSES OF VARIATION IN THE QUALITY OF RAW RUBBER AND LATEX. Sol: Gel Ratio in Relation to the Ultimate Physical Properties of Rubber. D. Spence and J. D. Ferry, *J. Soc. Chem. Ind.*, 58, 345-51 (1939).

HARD RUBBER REACTIONS. VII. S. Numaziri, *J. Soc. Chem. Ind. Japan*, 42, 369-70b (1939).

"RUBBER" FROM PETROLEUM GASES. D. North, *Chem. & Met. Eng.*, Apr., 1940, pp. 220-24.

RUBBERLIKE PROPERTIES OF POLYBUTENE. W. J. Sparks, I. E. Lightbown, L. B. Turner, P. K. Frolich, and C. A. Klebsattel, *Ind. Eng. Chem.*, May, 1940, pp. 731-36.

PINE TAR AS AN INGREDIENT FOR RUBBER MIXTURES. A. M. Ushakov, *Lesokhim. Prom.*, 6, 1, 29-32 (1938).

PHYSICOCHEMICAL CONSTANTS OF THE HYDROCARBON FRACTION USED FOR REGENERATING RUBBER. K. Kuchinskaya and N. Panov. *Sbornik Trudov Opytnogo Zavoda im. Akad. S. V. Lebedeva*, 50-52 (1938).

ONE HUNDRED YEARS OF RUBBER COMPOUNDING. W. Esch, *Gummi-Ztg.*, Feb. 2, 1940, pp. 68-69.

COMPOUNDING FOR THE PRODUCTION OF RUBBER CABLES AND WIRES. H. Berger, *Gummi-Ztg.*, Jan. 26, 1940, pp. 53-54.

POSSIBILITY OF MANUFACTURE OF LIGHT CAOUTCHOUCINE IN THE UNITED PROVINCES (OF INDIA) AND DETECTION OF ADULTERATION IN COMMERCIAL SAMPLES. S. N. Ghatak and K. C. Mukherji, *J. Sci. Tech. India*, 4, 33-38 (1938).

CONTRIBUTION TO THE KNOWLEDGE OF THE CREAMING PROCESS. G. E. van Gils, *Arch. Rubbercultuur*, 23, 4, 256-96 (1939).

TENSILE TESTS FOR PLANTATION RUBBER. I. Sibiriakoff, *Rev. gén. caoutchouc*, Dec., 1939, pp. 365-74.

MANUFACTURE OF THE PRINCIPAL ACCELERATORS USED IN THE FRENCH LATEX INDUSTRY. C. Saint-Mleux, *Rev. gén. caoutchouc*, Dec., 1939, pp. 377-79.

PLASTICS AND SYNTHETICS. F. Jacobs, *Rev. gén. caoutchouc*, Dec., 1939, pp. 380-84. (To be continued.)

USE OF RUBBER IN WATER MAINS AND CONDUITS. D. J. van Wijk, *Rubber*, Dec., 1939, pp. 8-10.

INDUSTRIAL SOURCES OF RUBBER IN THE U. S. S. R. A. A. Nichiporovich, *Khim. Referat. Zhur.*, 2, 1, 102-103 (1939).

HEAT FORMATION IN RUBBER—A Method of Measurement. N. N. Mikhailov and S. E. Polyak, *Caoutchouc & Rubber (U. S. S. R.)*, 4-5, 27-38 (1939).

SWELLING MEASUREMENTS IN THE RUBBER LABORATORY. G. Proske, *Gummi-Ztg.*, Mar. 1, 1940, pp. 141-42; Mar. 8, pp. 167-68.

GUAYULE. S. M. Maschtakov, *Caoutchouc & Rubber (U. S. S. R.)*, 9, 36-40 (1939).

DETERMINATION OF THE HEAT CAPACITIES OF THE LIQUID PRODUCTS OF SYNTHETIC RUBBER PRODUCTION. N. Panov and I. Dudnikov, *Sbornik Trudov Opytnogo Zavoda im. Akad. S. V. Lebedeva*, 36-40 (1938).

EVALUATION OF RECLAIMS. R. A. Hublin, *Rev. gén. caoutchouc*, Nov., 1939, pp. 329-35. (Conclusion).

ABOUT SYNTHETIC RUBBER. H. Leduc, *Rev. gén. caoutchouc*, Jan., 1940, p. 8.

ON ULTRA-RAPID CONTROL OF RUBBER: Oxidation Test in a Quarter of an Hour. C. Dufraisse and J. Le Bras, *Rev. gén. caoutchouc*, Jan., 1940, pp. 9-13.

IN SEARCH OF "STANDARD" CREPE. C. Saint-Mleux, *Rev. gén. caoutchouc*, Jan., 1940, pp. 14-16.

PRELIMINARY INVESTIGATION OF THE SWELLING OF VULCANIZED NATURAL RUBBER IN ORGANIC MEDIA. N. H. van Harpen, *Arch. Rubbercultuur*, 23, 4, 232-38 (1939).

TAPPING RESULTS ON SOME NEW A.V.R.O.S. HEVEA CLONES WHICH ORIGINATED IN CROSS-POLLINATIONS. *Arch. Rubbercultuur*, 23, 4, 193-231 (1939).

PRODUCTION AND APPLICATION OF THE ELECTRICAL INSULATION MATERIAL STYROFLEX. H. Horn, *Kunststoffe*, Mar., 1940, pp. 53-57.

MANUFACTURE AND USE OF POLYVINYLCHLORIDE (VINIDUR). E. Romer, *Kunststoffe*, Mar., 1940, pp. 69-71.

BUNA IN THE MANUFACTURE OF CABLES. H. Roelig, *Kautschuk*, Mar., 1940, pp. 26-33.

Patents and Trade Marks

MACHINERY

United States

2,197,077. **Tire Balancer.** L. M. Littlefield, Springfield, Mass., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.

2,197,111. **Braiding Machine.** J. A. Muller, Passaic, N. J., assignor to United States Rubber Co., New York, N. Y.

2,197,364. **Wheel Balancing Unit.** P. F. Hatch, Ypsilanti, assignor to H. C. Loney Co., Detroit, both in Mich.

2,197,441. **Hydraulic Press.** J. A. Perony, assignor to Société d'Outillage Mécanique et d'Usinage d'Artillerie, both of Saint-Ouen, France.

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388,325. **Continuous Vulcanizing Apparatus.** A. L. Wallace, Northport, N. Y., U. S. A.

388,390. **Tire Cord Tensioning Mechanism.** Drummondville Cotton Co., Ltd., Montreal, assignee of J. G. Kershaw, Westmount, both in P. Q.

United Kingdom

515,713. **Safety Devices** for Hydraulic Presses. J. Shaw & Sons (Salford), Ltd., and J. B. Shaw.

515,785. **Tire Retreading Molds.** H. W. K. Jennings, (Super Mold Corp.).

515,790. **Molding Presses.** Molded Insulation Co.

515,813. **Apparatus to Mold Buttons or Like Perforated Articles.** J. W. Matthews.

515,827 and 515,830. **Tire Retreading Molds.** H. W. K. Jennings, (Super Mold Corp.).

PROCESS

United States

2,196,577. **Sheet Stock of Vinyl Resin.** L. M. Currie, Lakewood, and L. K. Merrill, Berea, both in O., assignors to Carbide & Carbon Chemicals Corp., a corporation of N. Y.

2,196,803. **Articles of Polyvinyl Chloride** Free from Softening and Plasticizing Agents. G. Wick, Bitterfeld, assignor to I. G. Farbenindustrie A. G., Frankfurt a.M., both in Germany.

2,196,808. **Elastic Fabrics.** T. G. Hawley, Jr., Naugatuck, Conn., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.

2,197,087 and 2,197,088. **Continuous Process for Manufacturing Rubber Threads, Strips, Etc. from Latex.** H. L. Welker and F. Cremer, both of Williamsport, Pa., assignors to H. L. Welker.

2,197,127. **Bonding Olefin Polysulphide Plastics to Flexible Bases with Uncured Rubber.** E. Eger, Grosse Pointe Park, Mich., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.

2,197,188. **Elastic Fabric.** S. C. Lilley, Hamden, assignor to American Mills Co., New Haven, both in Conn.

2,197,569. **Industrial Belts.** E. G. Kimmich, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.

2,197,894. **Sponge Rubber Manufacture** Including Pressure, Heat, and Vacuum Treatments. H. R. Minor, assignor to Industrial Process Corp., both of Dayton, O.

2,198,927. **Extrusion Products** from Polymerization Products of Diene Hydrocarbons. (Synthetic.) H. I. Waterman and W. L. J. de Nie, both of Delft, Netherlands, assignors to Shell Development Co., San Francisco, Calif.

2,199,006. **Sponge Rubber Cushions** with Horizontal Tubes. H. R. Minor, assignor to Industrial Process Corp., both of Dayton, O.

Dominion of Canada

387,583. **Coated Wrapping Material** with a Composition Containing Halogenated Rubber. M. F. Monbiot, London, and J. R. E. Stoddard, Wigton, Cumberland, both in England.

387,598. **Tire Cord** of High Tensile Strength and High Heat Resistance. P. E. Harrison, Dover, N. H., U. S. A.

387,654. **Rubber Base Sheeted Abrasive.** (Latex.) Minnesota Mining & Mfg. Co., assignee of L. A. Hatch, both of St. Paul, Minn., U. S. A.

387,797. **Abrasive Wheel.** Norton Co., assignee of B. Sanford, both of Worcester, Mass., U. S. A.

388,454. **Adhering Rubber to a Ferrous Metal** Successively Coated with Zinc, Copper, and Nickel. W. W. De Lamatter, Cleveland, O., U. S. A.

United Kingdom

516,092. **Concentrating, Purifying, and Separating the Disperse Phase of Colloidal Dispersions.** Semperit Osterreichisch-Amerikanische Gummiwerke A. G.

CHEMICAL

United States

2,196,407. **Gasket Material** Comprising Shredded Cork and Polymerized Chloroprene. (Synthetic.) W. B. Atkinson, Pittsburgh, assignor to Westinghouse Electric & Mfg. Co., East Pittsburgh, both of Pa.

2,196,602. **Composition Containing Neoprene** Dissolved in a Dialkyl Ketone. (Synthetic.) A. W. Browne, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,196,607. **Preparation of a Di (Alkyl Thiazyl) Disulphide.** R. A. Mathes, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,196,714. **Rubbery Polymer** of Methyl Vinyl Ketone. (Synthetic.) V. E. Wellman, Silver Lake, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,196,719. **Antioxidant**—4-Methoxy-4'-Methyl-N-Methyldiphenylamine. W. Baird, R. F. Goldstein, M. Jones, and E. M. Meade, all of Blackley, Manchester, England, assignors to Imperial Chemical Industries, Ltd., a corporation of Great Britain.

2,196,855. **Protective Coating** for Copper Wires to Be Rubber Insulated, Comprising an Alloy of Lead, Tin, and Antimony. W. Dietloff, Berlin-Johannisthal, Germany, assignor to General Electric Co., a corporation of N. Y.

2,197,240. **Chewing Gum Base** Containing an Olefine-Diolefine Resin. G. A. Hatherell, Roscoe, assignor to F. A. Garbutt, Los Angeles, both in Calif.

2,197,433. **Stable Lubricating Grease** with a Low Absorbability in Rubber, Comprising a Mixture of Calcium Stearate and a Paraffinic Petroleum Oil. W. A. Lutz, assignor to Gulf Research & Development Co., both of Pittsburgh, Pa.

2,197,552. **Bond for Abrasive Particles** Comprising Shellac, Rubber, or Synthetic Resin Used with a Secondary Bonding Material—Selenium, Tellurium, or Sulphide Compounds. J. N. Kuzmick, assignor to Raybestos-Manhattan, Inc., both of Passaic, N. J.

2,197,570. **Accelerator**—Alpha Thioacyl-Thio-Cyclohexanone. I. G. Lichty, Stow, O., assignor to Wingfoot Corp., Wilmington, Del.

2,197,574. **Accelerator**—Reaction Product of an N-Halo Imide of a Dicarboxylic Acid with a Dithiocarboxylic Acid. G. W. Watt, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.

2,197,629. **Abrasive Bonding Agent** for Flexible Abrading Element Comprising a Rubber Isomer. H. G. Bartling, Chicago, Ill., assignor to Minnesota Mining & Mfg. Co., St. Paul.

2,197,718. **Chewing Gum** including Lanolin and Jelutong. H. W. Conner, assignor to Wm. Wrigley, Jr., Co., both of Chicago, Ill.

2,197,719. **Chewing Gum** Including Chicle and Phosphatide. H. W. Conner, assignor to Wm. Wrigley, Jr., Co., both of Chicago, Ill.

2,198,794. **Rapid Solution of Vinyl Resins** by Wetting with Non-solvent Liquid Penetrant before Addition of Solvent. (Synthetic.) C. N. Smith, Rocky River, O., assignor to Carbide & Carbon Chemicals Corp., a corporation of N. Y.

2,198,865. **Preparing Jelutong** for Use in Chewing Gum Bases by Washing, Drying, and Heating in an Oxygen Atmosphere. R. P. Dyckman, Orange, N. J., assignor to L. A. Dreyfus Co., Rosebank, Staten Island, N. Y.

2,198,970. **Artificial Material** Comprising Polyvinyl Compounds Softened with Certain Organic Plasticizers. (Synthetic.) H. Müller, Berlin-Wilmersdorf, assignor to Siemens-Schuckertwerke A. G., Berlin-Siemensstadt, both in Germany.

2,198,973. **Reducing Viscosity of Chlorinated Rubber** by Treatment in Solution with Chlorine and an Oxygen-Containing Gas. J. M. Peterson, Kennett Square, Pa., assignor to Hercules Powder Co., Wilmington, Del.

2,199,002. **Vulcanizing Rubber** in Presence of Accelerator Comprising Tetra-Amyl Thiuram Monosulphide, an Amyl Thiourea, and an Amyl Urea. A. J. Laliberte, Naugatuck, Conn., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.

2,199,099. **Incorporating Gas Black** in Rubber in Presence of Oxygen or Activated Oxygen. E. N. Cunningham, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,199,105. **Vulcanizing Rubber** in Presence of Diaryl Dithiocarbamic Acid, Its Salt, or Its Ester, and a Mercaptothiazole or a Dithiazyl Sulphide. P. C. Jones, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

Dominion of Canada

387,639. **Printing Blanket.** (Latex.) Dewey & Almy Chemical Co. of Canada, Ltd., Ville La Salle, P. Q., assignee of S. B. Neiley, Winchester, Mass., U. S. A.

387,641. **Mixed Aqueous Ammoniacal Dispersions** of Rubber and Chloro-2-Butadiene-1,3 Polymer. (Synthetic and Latex.) E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., assignee of B. Dales, Chadds Ford, Pa., and F. B. Downing, Carney's Point, N. J., all in U. S. A.

387,669. **Increasing the Form-Stability of Polyvinyl Resins** by Adding a Permanently Fusible Phenolic Resin. Shawinigan Chemicals, Ltd., Montreal, assignee of E. P. Irany, Shawinigan Falls, both in P. Q.

388,132. **Mercapto Aryl Thiazole Preparation.** Wingfoot Corp., Wilmington, Del., assignee of A. M. Clifford, Stow, O., both in U. S. A.

388,133. **Dithio Carbamate Stabilization.** Wingfoot Corp., Wilmington, Del., assignee of C. F. Winans, Akron, O., both in U. S. A.

388,214. **Rubber and Viscose Adhesive** for Treating Cords and Fabrics for Use in Rubber Manufacture. (Latex.) Du Pont Rayon Co., New York, assignee of W. H. Charch, Buffalo, both in N. Y., and D. B. Maney, Old Hickory, Tenn., co-inventors, all in U. S. A.

United Kingdom

515,763. **Dispersions of Rubber.** (Latex.) Dewey & Almy, Ltd., (Dewey & Almy Chemical Co.)

516,118. **Polyvinyl Synthetic Resins.** Kodak, Ltd.

GENERAL

United States

2,195,397. **Ventilated Shoe.** A. Cyr, St. Laurent, assignor of 35% to H. Barrette, St. Jerome, both in P. Q., Canada.

2,195,422. **Jar Closure.** G. J. Overmeyer, Hartford City, Ind.

2,195,468. **Elastic Collar and Tie Clasp.** A. C. Patch, Topeka, Kan.

2,195,473. **Wheel Balancing Weight.** J. Von Brethorst, Oakland, Calif.

2,195,487. **Dual Wheel Assembly.** J. F. Higbee, Detroit, Mich.

2,195,492. **Pipe-Hose Coupling.** F. A. McDonald, San Francisco, Calif.

2,195,500. **Refrigerator Door.** E. F. Schweller, assignor to General Motors Corp., Dayton, O.

2,195,565. **Gasket** for Air Purifier. W. J. Fricke, assignor to E. D. Bullard Co., both of San Francisco, Calif.

2,195,589. **Dual Wheel Mounting.** C. L. Eksergian, Detroit, Mich., assignor to Bud Wheel Co., Philadelphia, Pa.

2,195,590. **Wheel Mounting.** C. L. Eksergian, Detroit, Mich., assignor to Bud Wheel Co., Philadelphia, Pa.

2,195,628. **Aprons** for Fruit Orientor. G. P. Marsden, Riverside, assignor to Food Machinery Corp., San Jose, both in Calif.

2,195,632. **Latex-covered Spring Steel Mesh.** W. Reum and L. H. Hamilton, assignors to National Standard Co., all of Niles, Mich.

2,195,658. **Egg Candler.** C. T. Patterson, Springfield, Mo.

2,195,708. **Fluid Seal.** A. D. Owen, Berkeley, assignor to National Oil Seal Co., Oakland, both in Calif.

2,195,736. **Life-Saving Suit.** J. C. Myers, Washington, D. C.

2,195,776. **Vehicle Turn Signal.** V. Geisheimer, Chicago, Ill.

2,195,817. **Knee Shoe.** J. Johnson, Newark, N. J.

2,195,830. **Drain Cleaner.** A. A. Schubring, Sunnyside, N. Y.

2,195,873. **Cushion Joint.** H. C. and T. Lord, both of Erie, Pa., T. Lord assignor to H. C. Lord.

2,195,894. **Garment Support.** J. V. Moore, assignor to Moore Fabric Co., both of Pawtucket, R. I.

2,195,895. **Attaching Tape.** J. V. Moore, assignor to Moore Fabric Co., both of Pawtucket, R. I.

2,195,896. **Elastic Fabric.** J. V. Moore, assignor to Moore Fabric Co., both of Pawtucket, R. I.

2,195,915. **Rubber-Burlap Sole.** E. A. Bickford, assignor to Wiley-Bickford-Sweet Corp., both of Worcester, Mass.

2,195,933. **Cable Joint.** J. M. Marlborough, Millbury, and J. J. Morrison, Worcester, both in Mass., assignors to American Steel & Wire Co. of New Jersey, a corporation of N. J.

2,195,982 and 2,195,983. **Anti-skid Devices.** F. J. Daley, Schenectady, N. Y.

2,195,985. **Sponge Rubber Bulletin Board.** G. E. Fox, Chicago, Ill.

2,195,994. **Mounting Block** for Rubber Stamps. E. W. Morse, Rochester, N. Y.

2,196,058. **Method of and Apparatus for Polishing Containers.** H. P. Coats, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,196,083. **Auto Floor Board Seal.** C. Saurer, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,196,145. **Dress Marker.** E. Stanziale, White Plains, N. Y.

2,196,225. **Tire-Type Bumper** for Automotive Vehicles. W. L. Morrison, Lake Forest, Ill.

2,196,258. **Flexible Mold** for Ceramic Articles. R. W. Erdle, Chicago, Ill., assignor to Dental Research Corp., a corporation of Ill.

2,196,284. **Gum Massager.** D. L. Ackerman, Los Angeles, Calif.

2,196,296. **Bandage.** O. E. Flynn, Los Angeles, Calif.

2,196,337. **Flexible Cup.** E. F. Loweke, assignor to Hydraulic Brake Co., both of Detroit, Mich.

2,196,365. **Mop.** S. Schulman, New York, N. Y.

2,196,388. **Cushion Seal Bearing.** W. Ewald, assignor to Young Radiator Co., both of Racine, Wis.

2,196,428. **Resilient Mounting.** C. Saurer, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,196,456. **Group Sprinkling Apparatus.** F. B. Charroin, San Diego, Calif.

2,196,492. **Foundation Garment.** (Latex.) D. M. Clark, Worcester, Mass., and H. J. Stuart, Milford, Conn.

2,196,551. **Window Cleaner.** K. W. Fischer, Hyde Park, and J. Kadis-Ohlen, Roxbury, both in Mass.

2,196,582. **Gasket and Assembly.** F. W. Armstrong, assignor to Garlock Packing Co., both of Palmyra, N. Y.

2,196,615. **Sound Deadener.** L. C. Surprenant, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,196,621. **Apparatus for Treating Textile Fibers.** H. T. Battin, Ridgewood, N. J., and W. F. Silva, New York, N. Y., assignors to United States Rubber Co., New York, N. Y.

2,196,668. **Packing** for Well Devices. T. M. Ragan, Downey, assignor to Baker Oil Tools, Inc., Huntington Park, both in Calif.

2,196,695. **Washing Machine.** G. E. Davies, South Bend, Ind.

2,196,718. **Vehicle Wheel.** C. S. Ash, Milford, assignor to Kelsey-Hayes Wheel Co., Detroit, both in Mich.

2,196,785. **Rubber Stopper** for Bottles, Jars, Etc. E. Takiguchi, Tokyo, Japan.

2,196,807. **Waterproof Covering** for Roofs. C. R. Eckert, Englewood, N. J., assignor to Metropolitan Roofing Supplies Co., Inc., New York, N. Y.

2,196,812. **Comb.** E. Kreutzig, Jersey City, N. J.

2,196,814. **Multiple-Chamber Pneumatic Tire.** D. O. McClay, Seattle, Wash.

2,196,815. **Comb.** L. T. Sawyer, Fitchburg, Mass.

2,196,870. **Nipple.** J. Little, Warwick, assignor to Davol Rubber Co., Providence, both in R. I.

2,196,896. **Dental Matrix.** W. A. Dvorak, St. Paul, Minn.

2,196,909. **Respiratory and Circulatory Condition Recorder.** T. Bradford, assignor to W. J. Cameron, both in Chicago, Ill.

2,196,912. **Crying Doll.** J. S. Gilbraith, Ira, O.

2,196,923. **V-Belt Pulley.** J. H. Johanson, assignor to Cleveland Heater Co., both in Cleveland, O.

2,196,933. **Bumper** for Ironer Table and Base. D. L. Mooar, assignor to Maytag Co., both of Newton, Iowa.

2,196,935. **Bowl Cleaner.** C. D. Muller, Niles Township, Mich., and A. Z. Bender, Chicago, Ill.; Bender assignor to Muller.

2,196,953. **Gasket Pressure Control.** H. Bohmer, Jr., Woodbury Heights, and S. S. Lippincott, Palmyra, assignors to "Flexitallic" Gasket Co., Camden, all in N. J.

2,196,957. **Elastic Fabric.** C. A. Cosman, assignor to Elastic Mfg. Co., Ltd., both of Basel, Switzerland.

2,196,990. **Wheel Construction.** G. H. Hunt, Detroit, Mich., assignor, by mesne assignments, to Detroit Hydrostatic Brake Corp., a corporation of Mich.

2,197,030. **Railway Cushioning Mechanism.** L. M. Clark, Snyder, assignor to Waugh Equipment Co., New York, both in N. Y.

2,197,081. **Motor Support.** E. H. Piron, assignor to Transit Research Corp., both in New York, N. Y.

2,197,093. **Artificial Foot.** H. C. Campbell, assignor of 45% to G. Edwards and 15% to J. P. Danks, all of Youngstown, O.

2,197,102. **Shoe** with Elastic Fabric Upper. C. E. Edwards, Beverly, Mass., assignor to United Shoe Machinery Corp., Flemington, N. J.

2,197,184. **Camera Lens Shade.** R. S. Kemp, Alhambra, Calif.

2,197,193. **Gasket** for Condenser Container. W. G. Pontis, Dayton, O., assignor to General Motors Corp., Detroit, Mich.

2,197,228. **Safety Swimming Suit.** A. Then, Astoria, N. Y.

2,197,261. **Meteorological Balloon** Comprising a Rubber Envelope with Interior Coated with Dry Powdered Pigment for Coloring. A. P. Rehbock, Belmont, assignor to Dewey & Almy Chemical Co., North Cambridge, both in Mass.

2,197,324. **Non-sinkable Bathing Suit.** A. L. Sommers and A. M. Littger, assignors of 5% to R. Block, all of Newburgh, N. Y.

2,197,356. **Storage Battery Specific Gravity Marker Plug.** G. H. B. West, assignor to Electric Storage Battery Co., both of Philadelphia, Pa.

2,197,384. **Valve.** F. J. Raybould, Erie, assignor to Raybould Coupling Co., Meadville, both in Pa.

2,197,402. **Wringer.** C. W. Williams, Kinsman, O.

2,197,409. **Steering Wheel Cover.** F. P. Jackson, Antonio, Tex.

2,197,422. **Wheel Balancing Weight.** W. F. Wright, Los Angeles, assignor to E. R. Radabaugh, San Pedro, both in Calif.

2,197,475. **Hair Curler.** F. Kapelman, Bronx, assignor to Bolta Comb Co., Inc., New York, both in N. Y.

2,197,531. **Drill Pipe Protector.** W. G. L. Smith, Los Angeles, Calif.

2,197,544. **Cable** with Reduced Skin Effect Loss. R. W. Atkinson, Westfield, N. J., assignor to General Cable Corp., New York, N. Y.

2,197,551. **Toilet Brush.** N. W. Jensen, assignor to Hughes-Autograf Brush Co., Inc., both of Troy, N. Y.

2,197,568. **Rigid Airship.** L. H. Donnell, assignor to Goodyear-Zeppelin Corp., both of Akron, O.

2,197,583. **Combination Brake and Wheel Construction.** R. L. Koeppen and L. R. Buckendale assignors to Timken-Detroit Axle Co., all of Detroit, Mich.

2,197,592. **Garment Supporter.** S. Punch, Bloomfield, Mo.

2,197,596. **Bottle Wiper.** R. A. Short, Champaign, Ill.

2,197,617. **Balloon Air Stopper and Holder.** G. Magran, New York, N. Y.

2,197,624. **Insecticide and Insect Repellent.** W. P. ter Horst, Packanack, Lake, and R. W. Eldridge, Nutley, both in N. J., assignors to United States Rubber Co., New York, N. Y.

2,197,645. **Casket Top.** P. O. Krogh, assignor to Superior Body Co., both of Lima, O.

2,197,662. **Tire Tread** with Flexible Circumferential Ribs. H. T. Hughes, assignor of one-half to H. Lorig, both of Cleveland, O.

2,197,676. **Advertising Attachment** for License Plates. J. E. Barth, Sarasota, Fla.

2,197,689. **Medicament Applicator.** H. Fromm, London, England.

2,197,690. **Slider** for Separable Fasteners. G. M. Gay, Cheshire, Conn., assignor to United States Rubber Co., New York, N. Y.

2,197,694. **Combined Liquid Applicator and Kinesitherapy Device.** G. Grossen, Washington, D. C.

2,197,716. **Drain Cleaner.** H. W. Whitaker, assignor of 40% to C. Jernigan, both of Port Arthur, Tex.

2,197,741. **Abrasive Wheel** Comprising a Cylindrical Rubber Block and an Abrasive Band. M. M. Boucher, Tacoma, Wash., assignor to Behr-Manning Corp., Troy, N. Y.

2,197,767. **Hose Winder.** H. G. Neale, Vineland, N. J.

2,197,824. **Door Sealing Means.** W. Young, Washington, D. C.

2,197,839. **Boat Fender** of Expanded Rubber. D. Roberts, New York, L. Cooper, Flushing, and R. C. Bascom, Merrick, assignors to Rubatex Products, Inc., New York, all in N. Y.

2,197,914. **Hose Connection.** W. N. Bagley, Chicago, Ill.

2,197,915. **Packing and Power Transmission Unit** for Hydraulic Systems. P. S. Baldwin, Florence, Italy.

2,197,917. **Abrading Tool.** W. Barton, Leicester, England, assignor to United Shoe Machinery Corp., Flemington, N. J.

2,197,927. **Adjustable Floor Squeegee.** L. Ehrlich, Bronx, N. Y.

2,197,977. **Tennis Racket Cover.** A. Halpin, New York, N. Y.

2,197,986. **Carpet Sweeper Bumper.** F. W. Pullen, assignor to Bissell Carpet Sweeper Co., both of Grand Rapids, Mich.

2,197,996. **Cork-Rubber Foot Support.** C. H. Daniels, Greenwich, Conn.

2,198,008. **Inner Tube.** A. N. Iknayan, Indianapolis, Ind., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.

2,198,056. **Ornamental Wheel Disk Structure.** G. A. Lyon, Detroit, Mich.

2,198,057. **Wheel.** G. A. Lyon, Detroit, Mich.

2,198,122. **Valve.** P. F. Martin, South Ozone Park, N. Y.

2,198,135. **Engine Vibration Eliminator.** J. L. Strasburg, South Williamsport, F. J. Livingston, Williamsport, and G. C. Billman, Jersey Shore, all in Pa.

2,198,228. **Heel.** J. and S. Pinaud, both of Atlantic Highlands, N. J.

2,198,241. **Tracheal Tube.** W. F. Brehm, Rochester, Pa.

2,198,270. **Trailer.** H. F. Maranville, assignor to General Tire & Rubber Co., both of Akron, O.

2,198,332. **Vehicle Seat Back.** J. R. Cravath, Rock Island, Ill.

2,198,335. **Eraser Feeder.** A. Gaimari, Chicago, Ill.

2,198,338. **Cushioned Footwear.** J. B. Greider, Racine, Wis.

2,198,366. **Receptacle Venting Closure.** H. Ingram, Wheeling, W. Va.

2,198,386. **Valve.** H. M. Hiester and A. P. Barcus, assignors to United Aircraft Products, Inc., all of Dayton, O.

2,198,425. **Hair Net.** E. Berg, Chicago, Ill.

2,198,438. **Wheel Truck.** D. R. Knapp, assignor to Rol-A-Way Truck Co., both of Philadelphia, Pa.

2,198,462. **Wringer.** S. E. Schroeder, Chicago, Ill.

2,198,465. **Low Heat Conductivity Radio Cabinet.** W. J. B. Stokes, 2nd, Princeton, N. J., assignor to Jos. Stokes Rubber Co., Inc., a corporation of N. J.

2,198,478. **Tire Chain.** F. B. Hewel, Pittsburgh, Pa.

2,198,483. **Tire** with Reenforcement Strips at the Base of Tread Grooves. L. Marick, Grosse Pointe Farms, Mich., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.

2,198,510. **Dish Drainer and Sprayer.** S. Carcey, Kansas City, Mo.

2,198,546. **Ear Protector.** M. J. Lover and J. Colquitt, both of Shreveport, La.

2,198,550. **Teletypewriter Tape Wiper.** E. B. Mathews, Portland, Oreg., assignor to American Telephone & Telegraph Co., a corporation of N. Y.

2,198,586. **Tire** with Cords of Varying Twist. C. W. McKone, Washington, D. C., deceased; M. W. McKone, administratrix.

2,198,672. **Motor Mounting.** R. K. Lee, Highland Park, assignor to Chrysler Corp., Detroit, both in Mich.

Dominion of Canada

387,611. **Golf Club Handgrip.** W. L. Wettlaufer, Buffalo, N. Y., U. S. A.

387,689. **Combination Windshield Wiper and Defroster.** H. B. MacRobert, Florence, inventor, and R. L. MacRobert, Toronto, assignee of one-half the interest, both in Ont.

387,698. **Scissors Guard.** J. McLean, assignee of J. Coggans, both of Glasgow, Scotland.

387,787. **Polishing Machine Fixture.** Houdaille-Hershey Corp., assignee of General Spring Bumper Corp., assignee of J. H. Gould, all of Detroit, Mich., U. S. A.

387,803. **Undergarment.** A. Stein & Co., Chicago, assignee of C. Bullinger, Riverside, both in Ill., U. S. A.

387,831. **Sanding Machine.** P. T. Blood, Hamilton, Mont., U. S. A.

387,888. **Hydraulic Seal.** Detroit Hydrostatic Brake Corp., assignee of C. Sauzedde, both of Detroit, Mich., U. S. A.

387,895. **Vehicle Wheel.** French & Hecht, Inc., assignee of W. H. Hoffman, both of Davenport, Iowa, U. S. A.

387,896. **Wheel.** French & Hecht, Inc., Davenport, assignee of J. H. Ploehn, Bettendorf, both in Iowa, U. S. A.

387,913. **Elastic Top Hosiery.** Interwoven Stocking Co., New Brunswick, assignee of J. W. Mettler, East Millstone, both in N. J., and J. H. Miller and R. Evans, both of Martins-

burg, W. Va., co-inventors, all in the U. S. A.
387,916. **Vehicle Tactual Signal.** Kelch Heater Co., assignee of S. H. Caldwell, both of Detroit, Mich., U. S. A.
387,952. **Weaving Apparatus.** G. E. and R. H. Webster, co-inventors, both of Richmond Heights, and C. G. Perry, St. Louis, both in Mo., U. S. A., assignee of three-fifths of the interest.
387,953. **Ventilated Shoe.** A. Cyr, St. Laurent, inventor, and H. Barrette, St. Jerome, assignee of 35% of the interest, both in P. Q.
387,983. **Stuffing Box.** P. A. Homer, Victoria, B. C.
387,996. **Necktie Blank Cutter.** M. M. Newman, New York, N. Y., U. S. A.
388,019. **Panel Mounting.** Adlake Co., Chicago, Ill., assignee of J. Breackevelt, Elkhart, Ind., both in U. S. A.
388,024. **Rayon Tire Cord.** American Viscose Corp., Marcus Hook, assignee of I. P. Davis, Swarthmore, both in Pa., U. S. A.
388,033. **Sealing Means** for Water Pump. Briggs Mfg. Co., assignee of W. C. Casson, both of Detroit, Mich., U. S. A.
388,088. **Rubber Tire Valve Stem.** Jenkins Bros., assignee of H. Z. Gora, both of Bridgeport, Conn., U. S. A.
388,092. **Foundation Garment.** Kops Bros., Inc., assignee of W. Kops, both of New York, N. Y., U. S. A.
388,094. **Gas-Proof Container Material** Containing Rubber Hydrochloride. Liquid Carbonic Corp., assignee of M. Wagner, both of Chicago, Ill.
388,151. **Oversock.** A. M. Sperber, Montreal, and E. Coughlin, Westmount, co-inventors, both in P. Q.
388,159. **Aircraft Engine Mounting.** P. C. A. M. d'Aubarede, St.-Genis-Laval, Rhône, France.
388,160. **Rubber Covered Confection Handle.** H. E. Davis, Akron, O., U. S. A.
388,169. **Hose Clamp.** H. W. Goodall, Aldan, Pa., U. S. A.
388,190. **Insole.** Brown Co., assignee of M. O. Schur and E. M. Archer, co-inventors, all of Berlin, N. H., U. S. A.
388,209. **Leather Shoe.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of E. F. Roberts, Rye, N. Y., U. S. A.
388,220. **Sealing Gasket.** General Tire & Rubber Co., assignee of H. T. Kraft, both of Akron, O., U. S. A.
388,278. **Auto Door Handle Assembly.** S. C. Barnes, Detroit, Mich., U. S. A.
388,297. **Elastic Pulley and Wheel.** M. F. A. Julien, Paris, France.
388,301. **Vehicle Dual Wheel Mounting.** G. L. Larison, La Grande, Oreg., U. S. A.
388,308. **Shoe Calk.** L. W. Nitkey, Dudley, Idaho, U. S. A.
388,322. **Hose Supporter.** R. Tilly, New York, N. Y., U. S. A.
388,323. **Dust Mop.** J. A. Underhill, New York, N. Y., U. S. A.
388,343. **Foundation Garment.** Berger Bros. Co., assignee of I. R. Versoy, both of New Haven, Conn., U. S. A.
388,345. **Rubber Spring** for Vehicle Wheel Suspension. Briggs Mfg. Co., assignee of C. M. Sloman and H. Hierta, co-inventors, all of Detroit, Mich., U. S. A.
388,346. **Rubber Spring** for Vehicle Wheel Suspension. Briggs Mfg. Co., Detroit, assignee of J. Tjaarda, Birmingham, both in Mich., U. S. A.
388,369. **Refrigerator Cabinet.** Canadian Westinghouse Co., Ltd., Hamilton, Ont., assignee of O. H. Yoxsimer, East Springfield, Mass., U. S. A.
388,410. **Radio Receiver Chassis Mounting.** Philco Radio & Television Corp., Philadelphia, assignee of W. J. Snyder, Brookline, both in Pa., U. S. A.

United Kingdom

513,373. **Cables.** Allgemeine Elektricitats-Ges.
513,375. **Non-skid Tread Surfaces.** Dunlop Rubber Co., Ltd., and R. C. Davies.
513,378. **Cables.** Callender's Cable & Construction Co., Ltd., and L. G. Brazier.
513,443. **Pajama Bands.** G. H. and R. J. Atkin.
513,519. **Tractor Wheel.** H. A. Dixon.
513,535. **Wheel Rims.** G. Gianetti, (trading as Giulio Gianetti De Giuseppe E Gaetano Gianetti.)
513,551. **Elastic Woven Fabric.** A. S. and F. C. Flint and W. H. Rice.
513,630. **Cables.** W. T. Henley's Telegraph Works Co., Ltd., and H. A. Turnstall.
513,977. **Fluid-Pressure Operated Control Mechanisms.** Firestone Tire & Rubber Co., Ltd.
514,027. **Rubber-soled Footwear.** J. Giraud and M. M. Lacoste.
514,107. **Massage Appliance.** L. B. Colombi, O. Zanpulli, and L. Romonelli.
514,136. **Batteries.** Rulag Battery Co., Ltd.
514,158. **Windshield Wipers.** W. E. Oshei and Trico-Fol-Berth, Ltd.
514,233. **Artificial Bridge Teeth.** L. Czilling.
514,276. **Combined Combs and Brushes.** Betterwear Products, Ltd., and F. E. Willis.
514,280. **Eyepieces for Gas Masks, Etc.** M. Lubeigt.
514,391. **Elastic Mounting** for Power Vehicles. C. A. Voigt.
514,513. **Fountain Pens.** Mabie, Todd & Co., Ltd., L. W. Johnson, and E. S. Sears.
514,752. **Motor Mountings.** Getefo Ges. Fur Technischen Fortschrifft.
514,763. **Anti-skidding Liquid.** Trans Canada Holding Corp., Ltd.
514,773. **Engine Vibration Insulator.** W. A. Horrocks and S. M. Rowlands.
514,799. **Atomizer.** A. Degory, R. S. Hawkins, and C. J. H. Libovitz.
514,816. **Atomizer.** W. J. Strawson.
514,895. **Fountain Pens** Combined with Memorandum Appliances. H. McHugh.
514,904. **Pneumatic Tires.** E. Witzenmann.
514,921. **Gas Masks.** V. Horak.
514,924. **Balls.** B. J. Habgood and Imperial Chemical Industries, Ltd.
515,128. **Cables.** British Insulated Cables, Ltd., and J. L. Packer.
515,134. **Cables.** Solution Trust, Ltd., (Conducteur Electrique Blinde Incombustible.)
515,206. **Cables.** C. J. Beaver, E. L. Davey, and W. T. Glover & Co., Ltd.
515,336. **Belt-Drive Reduction Gears.** A. Camhi.
515,378. **Windshield Wipers.** Trico-Folbert, Ltd. (Trico Products Corp.)
515,416. **Cables.** I. D. Barr, (O. P. Wessel.)
515,588. **Cushion Insertion.** Hungarian Rubber Goods Factory, Ltd.
515,696. **Elastic Threads.** Wood, Barstow & Co., Ltd., G. J. S. Wood, and C. E. Barstow.
515,734. **Tires.** Michelin & Cie.
515,783. **Tires.** Firestone Tire & Rubber Co., Ltd.
515,965. **Windshield Wipers.** Rover Co., Ltd., J. Lucas, Ltd., A. Huyton, R. H. Purden, and P. A. Scott-Iversen.
516,002. **Flexible Mountings** for Measuring Instruments and Other Apparatus. Silent-bloc, Ltd., and S. W. Jelley.
516,096. **Tennis Balls and Like Rubber-cored Balls.** W. Sykes, Ltd., and W. J. Wycherley.
516,120. **Windshield Wipers.** R. Bosch Ges.

TRADE MARKS

United States

376,084. **Tips.** Chewing gum. Wm. Wrigley Jr. Co., Chicago, Ill.
376,094. Representation of a diamond containing the words: **"National Baseball Museum Inc. Hall of Fame, Cooperstown, New York."** Baseballs. National Baseball Museum, Inc., Cooperstown, N. Y.
376,098. Representation of a palm and words: **"Movie Guild of Hollywood Sportswear."** Sportswear and rainwear. M. Shapiro, doing business as Western Sportswear Co., Los Angeles, Calif.
376,142. **Stormtown.** Men's wear and raincoats. Weber & Heilbroner, Inc., Chicago, Ill.
376,154. Representation of an oval containing the words: **"Royal Fix-I-Base."** Bases of rubber and fabric for rubber cushions. United States Rubber Co., New York, N. Y.
376,157. **Cresmaid.** Foundation garments, brassieres, bandeaux, and combinations. J. C. Penney Co., Wilmington, Del.
376,162. **Gardenette.** Hose. Gates Rubber Co., Denver, Colo.
376,173. Representation of background of flame and a cat over an oval containing the letters: **"K & M Best in Asbestos."** Packings and gaskets. Keasbey & Mattison Co., Ambler, Pa.
376,175. **Little Middle.** Girdles. Lewel Mfg. Co., Inc., New York, N. Y.
376,185. Representation of a flower-like design consisting of a double circle of 16 angular figures, over the words: **"Step-a-long."** Heels and soles. Beebe Bros. Rubber Co., Nashua, N. H.
376,201. **Ideal.** Applicators and medicine droppers. Pyramid Rubber Co., Ravenna, O.
376,203. **Rayo-Flex.** Tire casings. B. F. Goodrich Co., Akron, O.
376,209. Representation of a diamond containing the words: **"Jenkins Trade Mark,"** with the numerals: **"96"** on the left and right hand sides of the diamond, over the words: **"Jenkins Bros."** Rubber sheet packing. Jenkins Bros., New York, N. Y.
376,216. **Deerwood.** Jar rings. United Buyers Corp., Chicago, Ill.
376,318. **Co-Hyde.** Fabrics coated with rubber compounds and simulating leather. Cotan Corp., Newark, N. J.
376,319. Representation of a saddle and the words: **"Saddle Cloth."** Raincoats and sportwear. D. Siegel Co., New York, N. Y.
376,325. **Take-along.** Syringes, parts, and attachments. Faultless Rubber Co., Ashland, O.
376,326. Representation of an oval figure with an airplane, automobile and trailer, ship, and a train in each of the four corners. Syringes, parts, and attachments. Faultless Rubber Co., Ashland, O.
376,335. **Stop-And-Go.** Wheels and rims. W. A. Brown, Philadelphia, Pa.
376,375. **Congress.** Tires. Gates Rubber Co., Denver, Colo.
376,380. **Journey-Gem.** Syringes, parts, and attachments. Faultless Rubber Co., doing business as Ashland Rubber Works, Ashland, O.
376,385. Representation of a circle dissected by a line, between the letters: **"Arb Ron."** Golf balls. Coreless Golf Ball Co., Wilmington, Del.
376,421. **Firestone Imperial.** Tires and tubes. Firestone Tire & Rubber Co., Akron, O.
376,456. **Code 352.** Camelback, tread and recap rubber, and tire and tube repair materials. Gates Rubber Co., Denver, Colo.
376,470. **Eclast.** Elastic fabric piece goods and artificial yarn combined with rubber. American Ecla Corp., Fairfield, Conn.
376,475. Two geometric figures with the letter: **"C"** in each. Chewing gum. American Chicle Co., Long Island City, N. Y.
376,491. **United Cross.** Druggists' sundries. United Cigar-Whelan Stores Corp., New York, N. Y.
376,496. **Tulatex.** Rubberized fibrous masses. E. B. & A. C. Whiting Co., Burlington, Vt.
376,500. **Pep-Pins.** Bowling pins. Buffalo Rubber & Supply, Inc. Buffalo, N. Y.
376,518. **Kogene.** Mechanical rubber goods. B. F. Goodrich Co., Akron, O.
376,537. **Lithocraft.** Lithographing rollers. Ideal Roller & Mfg. Co., Chicago, Ill.
376,586. **Kogene.** Synthetic composition having rubber-like characteristics. B. F. Goodrich Co., Akron, O.
376,603. Representation of a horse's head and the words: **"None Such."** Heels and soles. Beebe Bros. Rubber Co., Nashua, N. H.
376,642. **Belle of the Nineties.** Foundation garments. I. B. Kleinert Rubber Co., New York, N. Y.
376,662. **"Just Between You And Your Dress—."** Foundation slips, garments, and combinations. La Resista Corset Co., Bridgeport, Conn.
376,666. **Staylite.** Foundation garments. Stylette Corset Co., Chicago, Ill.
376,673. Representation of two Japanese symbols, translated as **"Power of Self."** Exercising belts. Oakland Food Products Co., also doing business as Shinano Co., Oakland, Calif.
376,678. **"Fair Trampers."** Footwear. Liberman Shoe Mfg. Co., Inc., Brooklyn, New York.
376,707. **Liquid Cushion.** Cement to make rubber tacky. H. Friedman, doing business as Commercial Rubber Co., Los Angeles, Calif.
376,712. **Elasti-Glass.** Belts, suspenders, and hose supporters. S. Buchsbaum & Co., Chicago, Ill.
376,715. Fanciful representation of a girl dancing and the word: **"Caper."** Wearing apparel. Hecht Co., Washington, D. C.
376,718. **Mendex.** Fabric patching kits. Mendex Corp., Cleveland, O.
376,721. **Classic Moderns.** Footwear. Huiskamp Bros. Co., Keokuk, Iowa.
376,731. Representation of a heavy zig-zag line under the words: **"Zig-Zag."** Elastic piece goods. Elastic S. A., Basel, Switzerland.
376,782. **Small-O-Dee.** Wires and cables. General Cable Corp., New York, N. Y.
376,814. **Firestone Frigitone.** Anti-freeze composition. Firestone Tire & Rubber Co., Akron, O.
377,011. Representation of bust of a Mexican and the word: **"Caballero."** Footwear. Cannon Shoe Co., Baltimore, Md.
377,013. **Nonstop.** Fountain pens, pencils, and desk sets. Parker Pen Co., Janesville, Wis.
377,024. **Magister.** Wearing apparel. Dunlop Rubber Co., Ltd., Erdington, Birmingham, England.
377,038. Oval containing the word: **"Hai-Line."** Fountain pens, pencils, and erasers. David Kahn, Inc., North Bergen, N. J.
377,039. **Needlepoint.** Fountain pens, pencils, and erasers. David Kahn, Inc., North Bergen, N. J.
377,041. **"Tire-Tone."** Rubber paste paint for weatherproofing rubber surfaces, preserving and revitalizing air bags for tire vulcanizing and retreading. Keel & Co., Inc., Philadelphia, Pa.
377,046. **General Coruly*e.** Shoe fillers. General Tire & Rubber Co., Akron, O.
377,050. **Marlene.** Elastic webbing, buttons, combs, and dress shields. J. J. Newberry Co., New York, N. Y.
377,065. **Heads Un.** Chewing gum. Frank H. Fleer Corp., Philadelphia, Pa.
377,092. **New York.** Suspenders and belts. Gem-Dandy Garter Co, Madison, N. C.
377,097. **Ecstasy Footwear. Joy in Every Step.** Footwear. Fred A. Mayer Shoe Co., Milwaukee, Wis.
377,148. **Speed.** Flexible abrasives. Behr-Manning Corp., Troy, N. Y.
377,167. Oval across which appear the words: **"Plio Seal."** Tape. Van Cleef Bros., Chicago, Ill.
377,192. **H-R.** Storage batteries. Willard Storage Battery Co., Cleveland, O.
377,216. **House of Beauty.** Foundation garments. I. Milgrim, Philadelphia, Pa.
377,219. **F. T. R.** Rubber substitute. Firestone Tire & Rubber Co., Akron, O.

Market Reviews

CRUDE RUBBER

Commodity Exchange

TABULATED WEEK-END CLOSING PRICES ON THE NEW YORK MARKET

Futures	Mar. 30	Apr. 27	May 4	May 11	May 18	May 25
Apr.	18.25	.....	.....	.....	.....	.....
May	18.10	19.24	19.90	23.20	21.50	20.17
June	.....	19.05	19.81	22.05	20.36	19.57
July	17.72	18.85	19.72	21.87	20.11	19.30
Sept.	17.59	18.62	19.22	21.10	18.55	18.18
Dec.	17.42	18.40	18.87	20.42	18.00	17.80
Mar.	.....	18.25	18.70	20.05	17.45	17.50
Apr.	.....	.....	18.70	20.05	17.40	17.45
Volume per week (tons)	7,610	8,880	13,020	19,030	23,520	11,040

FAST-MOVING war developments in Europe, together with increasing shipping problems, contributed to wide price movements in the rubber market last month. After closing at 18.65¢ per pound on April 30, July futures advanced on reports that rubber shipping space was being diverted to other materials and closed at 20.11¢ per pound on May 9. The following day, May 10, when Germany's lightning thrust into Holland was made, the price jumped the trading limit of 200 points to close at 22.11¢. The advance in the unrestricted spot month, May, amounted to 308 points, which brought that month up to 23.50¢. This was followed by continued speculative and distressed selling, which brought the price of July futures down to close on May 22 at 19.04¢ per pound, only 38 points above the closing price on May 1. Thereafter the market was stronger, and the closing price on May 29 was 19.55¢ per pound. Trading was active, particularly at midmonth. The maximum spread between spot and distant months increased sharply from 97 points on April 30 to 410 points on May 17.

Meeting in London on May 21 the International Rubber Regulation Committee continued the 80% export quota for the last half of 1940. The committee also requested the governments concerned to issue as soon as possible export permits for the whole period covered by the announcement. The permissible export total for 1940 will be 1,293,240 long tons.

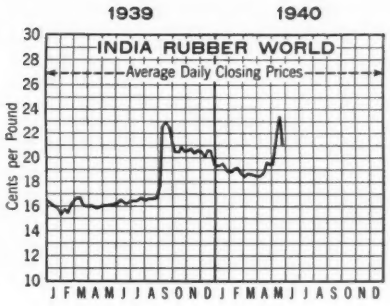
Rubber afloat from Netherland India, which had been bought on contracts calling for payment in guilders, is causing concern here. Since the German invasion of Holland, shippers have been demanding payment in dollars.

As predicted here last month, United States crude rubber consumption during April of 50,103 long tons was close to the March figure of 50,192 long tons. Indications point toward a somewhat higher figure for May consumption.

According to the Department of Commerce, imports of rubber in April were 70,699 long tons, the third highest on record. Reexports in April, according to preliminary reports, amounted to only 737 tons, compared to the revised figure of 975 tons for March. The April figure was the lowest for monthly reexports since the outbreak of war in Europe.

New Rubber Contract Adopted

A new standard rubber contract was adopted by the Commodity Exchange, Inc., 81 Broad St., New York, N. Y., on May 23. The new contract, as in the case of the old contract, is based on No. 1X Superior Quality Ribbed Smoked Sheets, packed in cases. While this was the only deliverable grade specified in the old contract, the following grades and packings, at the option of the seller, are also deliverable under the new contract at the respective allowances designated: No. 1X Superior Quality Ribbed Smoked Sheets, packed in bales, at a discount of 20 points; No. 1 Standard Quality Ribbed Smoked Sheets, packed in cases, at a discount of 15 points, and packed in bales, at a discount of 35 points.



New York Outside Market—Spot Ribbed Smoked Sheets

Trading in the new contract will begin at the opening of the exchange on June 17, 1940, the first delivery month to be July, 1940; from June 17 to 30, inclusive, trading shall be limited to the month of July, 1940, and the ten succeeding months, and during July, 1940, and thereafter trading shall be limited to the current month and the 11 succeeding months. No contracts shall be entered into calling for delivery of an old contract after May 29, 1941, and trading in the old contract will stop at 12 noon on May 27, 1941.

The new rubber contract is aimed at an avoidance of the possibility of a squeeze resulting from a shortage of the basic grade and packing. Thus it is felt that the trade will be more likely to use the futures market for hedging purposes. Other changes in the by-laws were also adopted. Notable among these is a ruling that authorizes the board of governors to change rubber trading regulations so as to conform with restrictions that may be imposed by a foreign government on the shipment of rubber to this country. This ruling contemplates restrictions of rubber exports similar to those imposed during the World War.

New York Outside Market—Spot Closing Prices—Plantation Grades—Cents per Pound

	April, 1940							May, 1940														
	22	23	24	25	26	27	29	30	1	2	3	4	6	7	8	9	10	11	13	14	15	16	17	18
No. 1 Ribbed Smoked Sheet.	19½	19½	19⅞	19¾	19¾	19⅝	19½	19¼	19¼	19½	20	20⅛	20	20⅛	20⅝	20⅝	25	23½	23⅜	24	23½	23½	23	22½
No. 1 Thin Latex Crepe.....	19½	19½	19⅞	19¾	19¾	19⅝	19½	19¼	19¼	19½	20	20⅛	20	20⅛	20⅝	20⅝	25	23½	23⅜	24	23½	23½	23	22½
No. 2 Thick Latex Crepe....	19½	19½	19⅞	19¾	19¾	19⅝	19½	19¼	19¼	19½	20	20⅛	20	20⅛	20⅝	20⅝	25	23½	23⅜	24	23½	23½	23	22½
No. 1 Brown Crepe.....	18½	18½	18⅞	18¾	18¾	18⅝	18½	18¼	18¼	18½	19	19⅛	19	19⅛	19⅝	19⅝	24	22½	22⅜	23	22½	22½	22	21½
No. 2 Brown Crepe.....	18⅜	18⅜	18⅞	18⅝	18⅝	18½	18⅜	18⅛	18⅛	18⅜	18⅞	19	18⅞	19	19½	19½	23⅞	22⅜	22¼	22⅞	22⅜	22⅛	21⅞	21⅜
No. 2 Amber.....	18½	18½	18⅞	18¾	18¾	18⅝	18½	18¼	18¼	18½	19	19⅛	19	19⅛	19⅝	19⅝	24	22½	22⅜	23	22½	22½	22	21½
No. 3 Amber.....	18⅜	18⅜	18⅞	18⅝	18⅝	18½	18⅜	18⅛	18⅛	18⅜	18⅞	19	18⅞	19	19½	19½	23⅞	22⅜	22¼	22⅞	22⅜	22⅛	21⅞	21⅜
Rolled Brown.....	15½	15½	15⅞	15¾	15¾	15⅝	15½	15¼	15¼	15½	16	16⅛	16	16⅛	16⅝	16⅜	21	19½	19⅜	20	19¼	19½	19	18½

New York Outside Market (Continued)

	May, 1940					
	20	21	22	23	24	25
No. 1 Ribbed Smoked Sheet.....	22¼	21¼	20¾	20½	20¾	20¾
No. 1 Thin Latex Crepe.....	22¼	21¼	20¾	20½	20¾	20¾
No. 2 Thick Latex Crepe.....	22¼	21¼	20¾	20½	20¾	20¾
No. 1 Brown Crepe	21	20	19½	19¼	19½	19½
No. 2 Brown Crepe	20¾	19¾	19¼	19	19¼	19¼
No. 2 Amber.....	21	20	19½	19¼	19½	19½
No. 3 Amber.....	20¾	19¾	19¼	19	19¼	19¼
Rolled Brown	17	16	15½	15¼	15½	15½

Trade Lists Available

The Commercial Intelligence Division recently compiled the following trade lists, of which mimeographed copies may be obtained by American firms from the U. S. Bureau of Foreign and Domestic Commerce or its district or cooperative offices by referring to the titles. The price is 10¢ a list for each country.

Automotive equipment, importers and dealers, Mexico.
Dental supply houses, Italy, Panama.
Electrical supplies and equipment, importers and dealers, Ecuador, Turkey.
Electrical wire and cable, manufacturers, Chile.
Rubber goods, manufacturers, Bulgaria, Switzerland.
Scrap rubber, importers, dealers, and reclaimers, Bulgaria.

ADVERTISING PAGES REMOVED

New York Outside Market

Activity in the actual market during May was reported fair, although with higher prices factories were buying largely for nearby or immediate requirements. Shipment offerings were generally scarce throughout the month, and these were taken by the trade. Along with the futures market, the outside market reacted wildly to war news. No. 1 ribbed smoked sheets, which closed at 19¼¢ per pound on April 30, jumped from 20⅝¢ on May 9 to close at 25¢ on May 10. This gain was lost as the price fell off to close at 20¾¢ per pound on May 22. The closing price on May 29 was 20¾¢ per pound, with the market steady.

The week-end closing prices on No. 1 ribbed smoked sheets follow: May 4, 20⅛¢; May 11, 23½¢; May 18, 22½¢; and May 25, 20¾¢.

New York Quotations

New York outside market rubber quotations in cents per pound

	May 24, 1939	Apr. 26, 1940	May 28, 1940
Plantations			
Rubber latex..*gal.*	60/61	76/77	78/79
Paras			
Upriver fine.....	14⅜	18¼	19¼
Upriver fine.....	*17¼	*20¾	*22
Upriver coarse ...	10	11½	12
Upriver coarse ...	*14¾	*17½	*19½
Islands fine.....	13¾	18	19
Islands fine.....	*16	*20	*21½
Acre, Bolivian fine	14½	18⅝	19½
Acre, Bolivian fine	*17½	*21	*22¾
Beni, Bolivian fine	15	19	20½
Madeira fine	14½	18¼	19¼
Caucho			
Upper ball	10	11½	12
Upper ball	*14¾	*17½	*19½
Lower ball	9¾	11	11
Pontianak			
Pressed block	9/16	13/17	13/18
Guayule			
Ampar	13¼	15	15
Africans			
Rio Nuñez	14	18½	18½
Black Kassai	14	18½	18½
Prime Niger flake	25	22½	22½
Gutta Percha			
Gutta Siak	9¼	17½	19¼
Gutta Soh	14	27	30
Red Macassar ...75/1.20		1.20	1.20
Balata			
Block Ciudad Bolivar	..	40	..
Manaos block ...	30	40	..
Surinam sheets ..	42	45	50
Amber	44	50	55

*Washed and dried crepe. Shipments from Brazil.

RECLAIMED RUBBER

ACCORDING to R. M. A. figures, April reclaimed rubber consumption is estimated at 16,298 long tons, 7.2% below that of March; production, 16,568 long tons; and stocks on hand April 30, 27,558 long tons. The demand for reclaim during May was reported somewhat better than that of April. According to the Department of Commerce, exports of reclaim from the United States in the first quarter of 1940 amounted to 8,767,000 pounds, value $455,262, which compares with shipments valued at $237,168 for the same period in 1939. Total exports for 1939 were 28,246,000 pounds, a figure close to that of the record year of 1937. Foreign markets for reclaim are limited to a few heavy consumers, notably Canada, United Kingdom, and China, and since the war Sweden has increased its consumption.

The market was unaffected by the disturbance in the crude rubber market, and all grades of reclaim hold at last month's quotations.

United States Reclaimed Rubber Statistics—Long Tons

Year	Production†	Consumption†	Consumption % of Crude	U. S. Stocks*†	Exports
1937	185,033	162,000	29.8	28,800	13,233
1938	122,403	120,800	27.6	23,000	7,403
1939	186,000	170,000	28.7	25,550	12,611
1940					
Jan.	19,297	16,070	29.2	27,418	1,059
Feb.	17,992	15,370	30.8	28,602	1,436
Mar.	17,234	15,931	31.7	28,488	1,420
Apr.	16,568	16,298	32.5	27,558	.....

*Stocks on hand the last of the month or year. †Corrected to 100% from estimate of reported coverage. *Compiled by The Rubber Manufacturers Association, Inc.*

New York Quotations

May 23, 1940

	Sp. Grav.	¢ per lb.
Auto Tire		
Black Select	1.16-1.18	6 / 6¼
Acid	1.18-1.22	7 / 7¼
Shoe		
Standard	1.56-1.60	6½/ 6¾
Tubes		
Red Tube	1.15-1.30	9 / 9¼
Compound	1.10-1.20	9 /10
Miscellaneous		
Mechanical Blends ...	1.25-1.50	4½/ 5
White	1.35-1.50	12½/14

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

Tire Production Statistics

Pneumatic Casings

	Inventory	Production	Shipments
1938	**8,451,390**	**40,906,735**	**43,132,302**
1939	8,664,505	57,612,731	57,508,775
1940			
Jan.	9,347,953	4,953,585	4,270,137
Feb.	10,123,824	4,888,250	4,112,379
Mar.	10,747,370	5,007,042	4,345,674
Apr.	10,881,029	5,105,953	5,009,762

Pneumatic Casings

	Original Equipment	Replacement Sales	Export Sales
1938	**10,716,130**	**30,565,008**	**1,048,934**
1939	18,207,556	38,022,034	1,279,185
1940			
Jan.	1,804,826	2,376,455	88,856
Feb.	1,974,466	2,051,487	86,426
Mar.	2,050,250	2,217,627	77,797
Apr.	2,095,220	2,823,293	91,249

Inner Tubes

	Inventory	Production	Shipments
1938	**8,165,696**	**37,847,656**	**40,292,614**
1939	7,035,671	50,648,556	51,190,314
1940			
Jan.	**7,633,798**	**4,286,924**	**3,826,667**
Feb.	7,896,960	4,210,904	3,809,733
Mar.	8,182,655	4,399,550	4,113,735
Apr.	8,258,331	4,618,361	4,542,735

Source: The Rubber Manufacturers Association, Inc. Figures adjusted to represent 100% of the industry.

RUBBER SCRAP

GOOD demand for scrap rubber was reported for May. Dealers are said to be inclined to hold their scrap in anticipation of higher prices. According to the Department of Commerce, scrap rubber exported from the United States in the first quarter of 1940 amounted to 21,658,000 pounds, value $425,885, against exports valued at $367,914 during the first quarter last year. Exports of scrap during 1939 totaled 96,791,000 pounds, far ahead of any previous year. The bulk of scrap rubber exported from this country continued to go to the Orient, with Japan the most important consumer.

The market is firm with small advances registered on the following types of scrap: No. 2 compound, red, and mixed tubes; mixed auto tires with beads and beadless; and mixed black mechanicals. Other prices continue unchanged.

Consumers' Buying Prices

(Carlot Lots for May 23, 1940)

	Prices
Boots and Shoes	
Boots and shoes, black....*lb.*	$0.01⅛/$0.01¼
Colored .....*lb.*	.00⅞/ .01
Untrimmed arctics .....*lb.*	.00⅞/ .01
Inner Tubes	
No. 1, floating.....*lb.*	.10 / .10½
No. 2, compound.....*lb.*	.04⅝/ .04⅞
Red .....*lb.*	.04½/ .04¾
Mixed tubes .....*lb.*	.03⅞/ .04¼
Tires (Akron District)	
Pneumatic Standard	
Mixed auto tires with	
beads .....*ton*	14.50 /15.50
Beadless .....*ton*	18.00 /18.50
Auto tire carcass.....*ton*	**30.00 /35.00**
Black auto peelings....*ton*	**26.00 /27.00**
Solid	
Clean mixed truck.....*ton*	34.00 /35.00
Light gravity .....*ton*	**42.00 /44.00**
Mechanicals	
Mixed black scrap.....*ton*	22.00 /24.00
Hose, air brake.....*ton*	20.00 /22.50
Garden, rubber covered.*ton*	12.50 /14.00
Steam and water, soft...*ton*	12.50 /14.00
No. 1 red .....*lb.*	.03 / .03¼
No. 2 red .....*lb.*	.02¼/ .02½
White druggists' sundries..*lb.*	.03¾/ .04
Mixed mechanicals .....*lb.*	.02¼/ .02½
White mechanicals.....*lb.*	.03⅝/ .03¾
Hard Rubber	
No. 1 hard rubber.....*lb.*	.11½/ .13

"Important Technical and Scientific Books.—1940 Catalog." Chemical Publishing Co., Inc., 146 Lafayette St., New York, N. Y. 40 pages. Many books of scientific and technical interest are listed in this catalog, including four specifically relating to rubber.

COMPOUNDING INGREDIENTS

ACTIVITY in the compounding ingredients market continued at the high level of the previous month with indications of a continuance of good demand for June. Prices in general are firm and unchanged.

CARBON BLACK. May movement of black to the rubber industry showed some improvement over the rather poor April volume. Production of carbon black in April ran 18,000,000 pounds ahead of sales, to bring stocks up to approximately 125,000,000 pounds. Quotations are unaltered.

FACTICE OR RUBBER SUBSTITUTE. The demand was reported fair, with prices unchanged.

LITHARGE. The car-lot price was reduced 10 points to 6.40¢ per pound for New York delivery. The demand was fair.

LITHOPONE. The demand was well maintained during May. The price is steady and unchanged.

RUBBER CHEMICALS. The demand for accelerators, antioxidants, and other rubber chemicals last month was reported to be slightly in excess of that of April. Prices are generally unchanged.

RUBBER SOLVENTS. The demand continued at a satisfactory level; while prices are firm and unchanged.

TITANIUM PIGMENTS. There has been a somewhat lessened demand from the rubber industry, but this has been more than offset by increased demand from the paint trade. Prices are firm and unrevised.

ZINC OXIDE. Sales to the rubber industry continued at a high level. There has been considerable export demand with more expected as supplies from Europe are now largely curtailed.

Current Quotations*

Abrasives

Pumicestone, powdered	lb.	$0.03 / $.035
Rottenstone, domestic	lb.	.03 / .035
Silica, 15	ton	

Accelerators, Inorganic

Lime, hydrated, *l.c.l.*, New York	ton	20.00
Litharge (commercial)	lb.	.0675/ .0725

Accelerators, Organic

A-1	lb.	.24 / .30
A-10	lb.	.31 / .35
A-11	lb.	.52 / .65
A-19	lb.	.52 / .65
A-32	lb.	.70 / .80
A-77	lb.	.42 / .55
A-100	lb.	.42 / .55
Accelerator 49	lb.	.40 / .42
737	lb.	.42 / .43
737-50	lb.	.25 / .26
808	lb.	.70 / .72
833	lb.	1.15
Acrin	lb.	.60
Aldehyde ammonia	lb.	.65 / .70
Altax	lb.	.55 / .60
B-J-F	lb.	.50 / .55
Beutene	lb.	.70 / .75
Butyl Eight	lb.	.98 / 1.00
Zimate	lb.	2.50
C-P-B	lb.	2.00
Captax	lb.	.50 / .55
Crylene	lb.	.40 / .47
Paste	lb.	.30 / .36
D-B-A	lb.	2.00
Delac A	lb.	.40 / .50
O	lb.	.40 / .50
P	lb.	.40 / .50
Di-Esterex-N	lb.	.60 / .70
DOTG (Di-ortho-tolyguanidine)	lb.	.44 / .46
DPG (Diphenylguanidine)	lb.	.35 / .45
El-Sixty	lb.	.50 / .65
Ethylideneaniline	lb.	.42 / .43
Ethyl Zimate	lb.	2.50
Formaldehyde P.A.C.	lb.	.0625
Formaldehydeaniline	lb.	.31
Formaldehyde-para-toluidine	lb.	.52 / .54
Guantal	lb.	.40 / .50
Hepteen	lb.	.35 / .40
Base	lb.	1.35 / 1.50
Hexamethylenetetramine U.S.P.	lb.	.39
Technical	lb.	.33
Lead oleate, No. 999	lb.	.13
Witco	lb.	.15
Ledate	lb.	2.35
Monex	lb.	2.35
Novex	lb.	
O-N-V	lb.	1.00 / 1.10
O-X-A-F	lb.	.50 / .55
Ovac	lb.	.50 / .55
Para-nitroso-dimethylaniline	lb.	.85
Pentex	lb.	1.00 / 1.10
Flour	lb.	.15 / .16
Pip-Pip	lb.	$2.50
Pipsolene	lb.	1.55 /$1.85
R-2	lb	1.40 / 1.80
R-23	lb.	.40
R & H 50-D	lb.	.42 / .43
Rotax	lb.	.60 / .65
Safex	lb.	1.20 / 1.30
Santocure	lb.	.80 / 1.00
Selenac	lb.	2.75
Super-sulphur No. 1	lb.	.50
2	lb.	.18 / .20
Tetrone A	lb.	2.70
Thiocarbanilide	lb.	.24 / .30
Thionex	lb.	2.35
Thiurad	lb.	2.35
Trimene	lb.	.55 / .65
Base	lb.	1.05 / 1.20
Triphenylguanidine (TPG)	lb.	.45
Tuads	lb.	2.35
Ureka	lb.	.60 / .75
Blend B	lb.	.60 / .75
C	lb.	.56 / .65
Vulcanex	lb.	.42 / .43
Vulcanol	lb.	.85
Z-B-X	lb.	2.50
Zenite	lb.	.46 / .48
A	lb.	.53 / .55
B	lb.	.46 / .48
Zimate	lb.	2.35

Activators

Aero Ac 50	lb.	.46 / .56
Barak	lb.	.50

Age Resisters

AgeRite Alba	lb.	1.50 / 1.65
Exel	lb.	1.00 / 1.02
Gel	lb.	.57 / .59
Hipar	lb.	.65 / .67
Powder	lb.	.52 / .54
AgeRite Resin	lb.	.52 / .54
D	lb.	.52 / .54
White	lb.	1.25 / 1.40
Akroflex C	lb.	.56 / .58
Albasan	lb.	.70 / .75
Aminox	lb.	.52 / .61
Antox	lb.	.56
B-L-E	lb.	.52 / .61
Powder	lb.	.65 / .74
B-X-A	lb.	.52 / .61
Copper Inhibitor X-872-A	lb.	1.15
Flectol B	lb.	.52 / .65
H	lb.	.52 / .65
White	lb.	.90 / 1.15
M-U-F	lb.	1.50
Neozone (standard)	lb.	.63
A	lb.	.52 / .54
B	lb.	.63
C	lb.	.52 / .54
D	lb.	.52 / .54
E	lb.	.63
Oxynone	lb.	.64 / .80
Parazone	lb.	.68
Permalux	lb.	1.20
Santoflex B	lb.	.52 / .65
Solux	lb.	1.30
Thermoflex A	lb.	.65 / .67
Tysonite	lb.	.16
V-G-B	lb.	.52 / .61

Alkalies

Caustic soda, flake, Columbia (400-*lb. drums*)	100 *lbs.*	2.70 / 3.55
liquid, 50%	100 *lbs.*	1.95
solid (700-*lb. drums*)	100 *lbs.*	2.30 / 3.15

Antiscorch Materials

A-F-B	lb.	$0.35 /$0.40
Antiscorch T	lb.	.90
Cumar RH	lb.	.10
E-S-E-N	lb.	.35 / .40
R-17 Resin (*drums*)	lb.	.10
RM	lb.	1.25
Retarder W	lb.	.36
U-T-B	lb.	.35 / .40

Antisun Materials

Heliozone	lb.	.22 / .23
Sunproof	lb.	.22 / .27

Brake Lining Saturant

B.R.T. No. 3	lb.	.0165/ .0175

Colors

Black

Du Pont powder	lb.	.42 / .44
Lampblack (commercial), *l.c.l.*	lb.	.15

Blue

Brilliant	lb.	
Du Pont dispersed	lb.	.83 / 3.95
Powders	lb.	2.25 / 3.75
Toners	lb.	.08 / 3.85

Brown

Mapico	lb.	.11

Green

Brilliant	lb.	
Chrome, light	lb.	
medium	lb.	.22
oxide (*freight allowed*)	lb.	
Dark	lb.	
Du Pont dispersed	lb.	.98 / 1.75
Powders	lb.	1.00 / 5.50
Guignet's (*bbls.*)	lb.	.70
Light	lb.	
Toners	lb.	.85 / 3.75

Orange

Du Pont dispersed	lb.	.88 / .98
Powders	lb.	.88 / 2.75
Lake	lb.	
Toners	lb.	.40 / 1.60

Orchid

Toners	lb.	1.50 / 2.00

Pink

Toners	lb.	1.50 / 2.00

Purple

Permanent	lb.	
Toners	lb.	.60 / 2.10

Red

Antimony Crimson, 15/17%	lb.	
R. M. P. No. 3	lb.	.48
Sulphur free	lb.	
R.M.P.	lb.	.52
Golden 15/17%	lb.	
7-A	lb.	.37
Z-2	lb.	.23
Cadmium, light (400-*lb. bbls.*)	lb.	.75 / .80
Chinese	lb.	
Crimson	lb.	
Du Pont dispersed	lb.	.93 / 2.05
Powders	lb.	.285 / .90
Mapico	lb.	.0925
Medium	lb.	
Rub-Er-Red (*bbls.*)	lb.	.0925
Scarlet	lb.	.08 / 2.00
Toners	lb.	.08 / 2.00

White

Lithopone (*bags*)	lb.	.036 / .0385
Albalith	lb.	.036 / .0385
Astrolith (50-*lb. bags*)	lb.	.0360/ .0385
Azolith	lb.	.0360/ .0385
Cryptone-BA-19	lb.	.05 / .0525
RT	lb.	.05 / .0525
CB	lb.	.05 / .0525
ZS No. 20	lb.	.075 / .0775
86	lb.	.075 / .0775
230	lb.	.075 / .0775
800	lb.	
Sunolith	lb.	.0360/ .0385
Ray-Bar	lb.	.0525/ .0575
Ray-Cal	lb.	.05 / .0525
Rayox	lb.	.13
Titanolith (50-*lb. bags*)	lb.	.05 / .0525
Titanox-A (50-*lb. bags*)	lb.	.13 / 1375
B (50-*lb. bags*)	lb.	.0525/ .0550
30 (50-*lb. bags*)	lb.	.0525/ .0550
C (50-*lb. bags*)	lb.	.05 / .0525
M (50-*lb. bags*)	lb.	.0525/ .0550
Ti-Tone	lb.	
Zinc Oxide		
Azo ZZZ-11	lb.	.0625/ .0650
44	lb.	.0625/ .0650
55	lb.	.0625/ .0650
66	lb.	.0625/ .0650
French Process, Florence		
Green Seal-8	lb.	.08 / .0825
Red Seal-9	lb.	.075 / .0775
White Seal-7	lb.	.085 / .0875

*Prices in general are f.o.b. works. Range indicates grade or quantity variations. Prices not recorded will be supplied upon request.

ZINC OXIDE (*Cont'd*)		
Kadox, Black Label-15	*lb.*	$0.065 /$0.0675
No. 25	*lb.*	.075 / .0775
Red Label-17	*lb.*	.065 / .0675
Horse Head Special 3	*lb.*	.0625/ .065
XX Red-4	*lb.*	.0625/ .065
23	*lb.*	.0625/ .065
72	*lb.*	.0625/ .065
78	*lb.*	.0625/ .065
80	*lb.*	.0625/ .065
103	*lb.*	.0625/ .065
110	*lb.*	.0625/ .065
St. Joe (lead free)		
Black Label	*lb.*	.0625/ .065
Green Label	*lb.*	.0625/ .065
Red Label	*lb.*	.0625/ .065
U.S.P.	*lb.*	.095 / .0975
White Jack	*lb.*	.075 / .0775
Zopaque (*50-lb. bags*)	*lb.*	.13 / .1375
Yellow		
Cadmolith (cadmium yellow), (*400-lb. bbls.*)	*lb.*	.50 / .55
Du Pont dispersed	*lb.*	1.25 / 1.75
Powders	*lb.*	.135 / 2.75
Lemon	*lb.*	
Mapico	*lb.*	.0675
Toners	*lb.*	2.50

Dispersing Agents

Bardex	*lb.*	.0395/ .042
Bardol	*lb.*	.0225/ .045
Darvan	*lb.*	.30 / .39
Nevoll (*drums, c.l.*)	*lb.*	.0225
Santomerse S	*lb.*	.11 / .25

Fillers, Inert

Asbestine, *c.l.*	*ton*	15.00
Barytes	*ton*	30.00 /36.00
f.o.b., St. Louis (50-*lb. paper bags*)	*ton*	22.85
off color, domestic	*ton*	20.00 /25.00
white, imported	*ton*	29.00 /32.00
Blanc fixe, dry, precip.	*lb.*	.03 / .035
Calcene	*ton*	37.50 /43.00
Infusorial earth	*lb.*	.02 / .03
Kalite No. 1	*ton*	24.00 /30.00
3	*ton*	34.00 /40.00
Kalvan	*ton*	121.00
Magnesia, calcined, heavy	*lb.*	.04
Carbonate, *l.c.l.*	*lb.*	.0725/ .095
Paradene No. 2 (*drums*)	*lb.*	.045
Pyrax A	*ton*	6.00 /20.00
Whiting		
Columbia Filler	*ton*	9.00 /14.00
Suprex, white extra light	*ton*	45.00
heavy	*ton*	45.00
Witco, *c.l.*	*ton*	6.00

Finishes

Rubber lacquer, clear	*gal.*	
colored	*gal.*	
Starch, corn, pwd. 100 *lbs.*		
potato	*lb.*	
Talc	*ton*	.025 / .035

Flock

Cotton flock, dark	*lb.*	.10 / .12
dyed	*lb.*	.40 / .80
white	*lb.*	.11 / .20
Rayon flock, colored	*lb.*	1.00 / 2.00
white	*lb.*	.75 / 1.00

Latex Compounding Ingredients

Accelerator 85	*lb.*	.35
89	*lb.*	1.40
122	*lb.*	1.55
552	*lb.*	2.50
Aerosol OT Aqueous 10%	*lb.*	.15 / .175
Antox, dispersed	*lb.*	.42
Aquarex A	*lb.*	.35
D	*lb.*	.75
F	*lb.*	.85
WA Paste	*lb.*	.28
Areskap No. 50	*lb.*	.18 / .24
100, dry	*lb.*	.39 / .51
Aresket No. 240	*lb.*	.16 / .22
300, dry	*lb.*	.42 / .50
Aresklene No. 375	*lb.*	.35 / .50
400, dry	*lb.*	.51 / .65
Black No. 25, dispersed	*lb.*	.22 / .40
Collocarb	*lb.*	.07
Color Pastes, dispersed	*lb.*	.35 / 1.90
Compound G-11 NW	*lb.*	
Dispersex No. 15	*lb.*	.11 / .12
No. 20	*lb.*	.08 / .10
Emo, brown	*lb.*	.16
white	*lb.*	.16
Factice Compound, dispersed	*lb.*	.36
Heliozone, dispersed	*lb.*	.25
Igepon A	*lb.*	
Latac	*lb.*	
MICRONEX, Colloidal	*lb.*	.055 / .0655
Nekal BX (dry)	*lb.*	
Palmol	*lb.*	.11
Pipsol X	*lb.*	3.05 / 3.55
R-2 Crystals	*lb.*	2.50 / 2.75
R-23	*lb.*	.40
RN-2	*lb.*	2.00 / 2.25
Crystals	*lb.*	2.00 / 2.25
S-1 (400-*lb. drums*)	*lb.*	.65
Santobrite Briquettes	*lb.*	.17 / .26
Powder	*lb.*	.16 / .26
Santomerse D	*lb.*	$0.41 /$0.65
S	*lb.*	.11 / .25
No. 1	*lb.*	.18 / .35
No. 2	*lb.*	.18 / .35
No. 3	*lb.*	.40 / .65
No. 3P	*lb.*	.29 / .45
Santovar A	*lb.*	1.15 / 1.40
Stablex A	*lb.*	.90 / 1.10
B	*lb.*	.65 / .90
C	*lb.*	.40 / .50
Sulphur, dispersed	*lb.*	.10 / .15
No. 2	*lb.*	.075
T-1 (400-*lb. drums*)	*lb.*	.40
Tepidone	*lb.*	1.20
Vulcan Colors	*lb.*	
Zinc oxide, dispersed	*lb.*	.12 / .15

Mineral Rubber

Black Diamond	*ton*	25.00
B.R.C. No. 20	*lb.*	.009 / .01
Hydrocarbon, hard	*ton*	23.00
Genasco Hydrocarbon, granulated	*ton*	
solid	*ton*	
Gilsonite	*ton*	
Parmr	*ton*	
Pioneer	*ton*	
285°-300°	*ton*	23.00 /42.00

Mold Lubricants

Mold Paste	*lb.*	.12 / .18
Sericite	*ton*	65.00 /75.00
Soapbark	*lb.*	
Soapstone, *l.c.l.*	*ton*	25.00 /35.00

Oil Resistant

AXF	*lb.*	.40 / .50

Reclaiming Oils

B.R.V.	*lb.*	.032 / .0345
No. 1621	*lb.*	.019 / .02
S.R.O.	*lb.*	.019 / .02
X-159	*gal.*	.20

Reenforcers

Carbon Black		
Aerfloted Arrow Specification (*bags only*)	*lb.*	.0265†
Arrow Compact Granulized	*lb.*	.0265†
Certified Heavy Compressed (*bags only*)	*lb.*	.0265†
Spheron	*lb.*	.0265†
Continental, dustless	*lb.*	.0265†
Compressed (*bags only*)	*lb.*	.0265†
Disperso	*lb.*	.0265†
Dixie	*lb.*	.0265†
Dixiedensed	*lb.*	.0265†
66	*lb.*	.0265†
Excello, dustless	*lb.*	.0265†
Fumonex	*lb.*	.03
Gastex	*lb.*	.03 / .07
Kosmobile	*lb.*	.0265†
66	*lb.*	.0265†
Kosmos	*lb.*	.0265†
MICRONEX Beads	*lb.*	.0265†
Mark II	*lb.*	.0265†
Standard	*lb.*	.0265†
W-5	*lb.*	.0265†
W-6	*lb.*	.0265†
P-33	*lb.*	.0475 / .0725
Pelletex	*lb.*	.03 / .07
Supreme, dustless	*lb.*	.0265†
Thermax	*lb.*	.02 / .0475
Velvetex	*lb.*	.022 / .035
"WYEX BLACK"	*lb.*	.0265†
Carbonex	*lb.*	.029 / .034
S	*lb.*	.03 / .0350
Clays		
Aerfloted Paragon (50-*lb. bags*)	*ton*	10.00
Suprex (50-*lb. bags*)	*ton*	10.00
Barden	*ton*	10.00
Catalpo, *c.l.*	*ton*	30.00
Chicora	*ton*	10.00
China	*ton*	17.50 /20.00
Crown	*ton*	10.00
Dixie	*ton*	10.00 /22.50
Hi-White	*ton*	10.00
Langford	*ton*	8.50
NcNamee	*ton*	10.00 /22.50
Par	*ton*	10.00
Paraforce, *c.l.*	*ton*	40.00
Witco, *c.l.*	*ton*	10.00
Cumar EX	*lb.*	.045
MH	*lb.*	.065 / .11
V	*lb.*	.09 / .12

Reodorants

Amora A	*lb.*	
B	*lb.*	
C	*lb.*	
D	*lb.*	
Compound G-4	*lb.*	
G-11	*lb.*	
Curodex 19	*lb.*	2.75
188	*lb.*	3.50
Para-Dors	*lb.*	4.50
Rodo No. 0	*lb.*	3.50 / 4.00
10	*lb.*	4.50 / 5.00
198	*lb.*	

†Price quoted is f.o.b. works (bags). The price f.o.b. works (bulk) is 2.50¢ per pound; f.o.b. Hoboken (bulk), 3.38¢; f.o.b. No. Atlantic Docks (bags), 3.525¢. All prices are carlot.

Rubber Substitutes

Black	*lb.*	$0.08 /$0.12
Brown	*lb.*	.08 / .115
White	*lb.*	.085 / .135
Factice		
Amberex	*lb.*	.305
Brown	*lb.*	.08 / .115
Fac-Cel B	*lb.*	.135
C	*lb.*	.135
Neophax A	*lb.*	.0975
B	*lb.*	.0975
White	*lb.*	.09 / .125

Softeners

B.R.T. No. 7	*lb.*	.0165/ .0175
Bondogen	*lb.*	.98 / 1.25
Burgundy pitch	*lb.*	.06
Cycline oil	*gal.*	.14 / .20
Dispersing Oil No. 10	*lb.*	.0335/ .036
Nuba resinous pitch (*drums*)		
Grades No. 1 and No. 2	*lb.*	.0265
Nubalene Resin	*lb.*	.025
Palm oil (Witco), *c.l.*	*lb.*	
Pine tar	*gal.*	
Plastogen	*lb.*	.0775/ .10
R-19 Resin (*drums*)	*lb.*	.10
21 Resin (*drums*)	*lb.*	.10
Reogen	*lb.*	.115 / .22
Rosin oil, compounded	*gal.*	.40
RPA No. 1	*lb.*	.65
2	*lb.*	.65
3	*lb.*	.46
Rubtack	*lb.*	.10
Tackol	*lb.*	.085 / .18
Tonox	*lb.*	.52 / .61
Tonox D	*lb.*	.75 / .85
Witco No. 20, *l.c.l.*	*gal.*	.20
X-1 resinous oil (*tank car*)	*lb.*	.01

Softeners for Hard Rubber Compounding

Resin C Pitch 45°C. M.P.	*lb.*	.013 / .014
60°C. M.P.	*lb.*	.013 / .014
75°C. M.P.	*lb.*	.013 / .014

Solvents

Beta-Trichlorethane	*gal.*	
Carbon bisulphide	*lb.*	
tetrachloride	*lb.*	
Cosol No. 1	*gal.*	.25 / .30
No. 2	*gal.*	.20 / .28
No. 3	*gal.*	.20 / .28
Industrial 90% benzol (*tank car*)	*gal.*	.16
Skellysolve	*gal.*	

Stabilizers for Cure

Laurex (*bags*)	*lb.*	.1075/ .1325
Stearex B	*lb.*	.10 / .11
Beads	*lb.*	.0975/ .1075
Stearic acid, single pressed	*lb.*	.10 / .11
Stearite, *c.l.* 100 *lbs.*		9.75
Zinc stearate	*lb.*	.24 / .26

Synthetic Rubber

Neoprene Type E	*lb.*	.65
G	*lb.*	.70
GN	*lb.*	
GW	*lb.*	.75
H	*lb.*	.78
M	*lb.*	.65
Latex Type 57	*lb.*	.30
Synthetic 190	*lb.*	.55

Tackifier

B.R.H. No. 2	*lb.*	.017 / .02

Varnish

Shoe	*gal.*	1.45

Vulcanizing Ingredients

Sulphur		
Chloride (*drums*)	*lb.*	.035 / .04
Rubber 100 *lbs.*		2.00
Telloy	*lb.*	1.75
Vandex	*lb.*	1.75
(See also Colors—Antimony)		

Waxes

Carnauba, No. 3 chalky	*lb.*	
2 N.C.	*lb.*	
3 N.C.	*lb.*	
1 Yellow	*lb.*	
2	*lb.*	
Montan, crude	*lb.*	

United States Latex Imports

Year	Pounds (d.r.c.)	Value
1938	26,606,048	$ 4,147,318
1939	61,460,003	10,467,552
1940		
Jan.	7,639,568	1,412,728
Feb.	4,862,684	947,524
Mar.	7,561,780	1,473,056

Data from Leather and Rubber Division, Washington, D. C.

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At last — a reliable Swing Joint for operation under high temperatures! No packing glands or stuffing boxes to repack or keep tight!

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Ducks

HOSE and BELTING
Ducks

Drills

Selected
Osnaburgs

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320 BROADWAY
NEW YORK

COTTON AND FABRICS

NEW YORK COTTON EXCHANGE WEEK-END CLOSING PRICES

Futures	Mar. 30	Apr. 27	May 4	May 11	May 18	May 25
Apr.	10.84	.....	.....	.....	.....	.....
May	10.74	10.94	10.82	10.53	.....	.....
June	.....	10.80	10.70	10.34	9.26	9.82
July	10.52	10.67	10.59	10.16	9.11	9.67
Sept.	10.14	10.37	10.24	9.88	8.76	9.13
Dec.	9.72	10.02	9.86	9.58	8.43	8.70
Mar.	9.58	9.86	9.69	9.43	8.22	8.51
Apr.	.....	.....	.....	.....	8.15	8.44

THE cotton market broke sharply last month under the impact of disturbing war news from Europe. The New York ⅞-inch spot middling price, after closing at 11.16¢ per pound on May 1, dropped sharply during the month to close at 10.16¢ per pound on May 22. The closing price on May 29 was 10.22¢ per pound, with the market firm.

The Census Bureau reported April consumption of all cotton, exclusive of linters, in domestic mills at 623,893 bales, against 626,331 bales in March and 543,187 bales in April, 1939. Exports of cotton in April totaled 344,609 bales, against 433,842 in March and 178,225 in April, 1939. Stocks of cotton in consuming establishments at the end of April were 1,469,617 bales, against 1,595,722 at the end of March and 1,292,565 at the end of April last year.

On May 6, President Roosevelt vetoed the Bankhead cotton crop insurance bill on the ground that the government does not yet have sufficient experience for a self-supporting crop insurance program.

Fabrics

The market for fabrics of coarse-yarn construction which had become quiet in mid-April continued inactive during May. With the uncertainties resulting from the spread of the war abroad, buyers restricted purchases to immediate requirements. The lowering of cotton futures prices added to the stalemate. Buying of cloth by government relief agencies, totaling about 30,000,000 yards, was the only favorable feature of the month.

The market in general is easier, with price reductions covering most types of drills, ducks, osnaburgs, and sheetings. Tire fabrics and hollands are steady and unchanged; while two types of raincoat fabrics advanced fractionally.

New York Quotations

May 27, 1940

Drills

38-inch 2.00-yard ..... *yd.*	$0.11⅛
40-inch 3.47-yard	.06⅞
50-inch 1.52-yard	.15⅝
52-inch 1.85-yard	.13
52-inch 1.90-yard	.12⅞
52-inch 2.20-yard	.11½
52-inch 2.50-yard	.10⅜
59-inch 1.85-yard	.13¼

Ducks

38-inch 2.00-yard D. F. ..... *yd.*	.11¼/.12½
40-inch 1.45-yard S. F.	.15⅞
51½-inch 1.35-yard D. F.	.18¼
72-inch 1.05-yard D. F.	.24½/.26
72-inch 17.21-ounce	.27¾

Mechanicals

Hose and belting ..... *lb.*	.25

IMPORTS, CONSUMPTION, AND STOCKS

United States and World Statistics of Rubber Imports, Exports, Consumption, and Stocks—Long Tons

Twelve Months	U.S. Imports*	U.S. Consumption¶	U.S. Stocks Mfrs., Dealers, Importers, Etc.†¶	U.S. Stocks Afloat	U.K.—Public Warehouses, London, Liverpool†‡	Singapore and Penang Dealers and Port Stocks†‡	World Production (Net Exports)‡	World Consumption Estimated‡	World Stocks†‡§
1937	584,851	543,600	262,204	63,099	57,785	44,792	1,139,800	1,105,002	646,252
1938	400,178	437,031	231,500	45,105	86,853	27,084	894,900	942,252	596,498
1939	499,473	592,000	125,800	91,095	.....	15,299	1,004,515	1,090,092	.....
1939									
Jan.	37,082	47,387	220,727	48,210	80,643	30,975	87,292	89,034	585,441
Feb.	31,038	43,422	207,882	55,814	75,517	28,559	77,280	83,867	568,780
Mar.	45,724	51,416	201,752	55,981	72,235	23,255	76,838	95,054	545,459
Apr.	32,031	45,268	188,074	57,918	68,931	22,434	73,893	86,882	518,651
May	45,886	45,484	187,980	54,046	66,020	20,849	70,812	89,305	511,847
June	34,363	48,438	173,493	51,274	63,878	19,563	65,053	90,952	500,837
July	37,372	44,975	165,450	52,990	57,234	27,042	84,498	87,901	497,126*a*
Aug.	38,586	51,740	152,029	66,717	44,917	20,543	92,407	96,962	477,666*a*
Sept.	37,669	51,402	136,824	68,310	.....	23,457	87,376	84,912	.....
Oct.	45,621	57,155	119,404	100,500	.....	25,376	115,154	97,826	.....
Nov.	42,706	55,677	105,205	114,044	.....	22,957	85,544	95,162	.....
Dec.	71,395	49,636	125,800*b*	91,095	.....	15,299	88,368	92,244	.....
1940									
Jan.	72,496	54,978	142,368*b*	90,285*b*	.....	35,928	108,705	97,545	.....
Feb.	43,088	49,832	134,328*b*	112,257*b*	.....	33,608	113,185	93,882	.....
Mar.	59,258	50,192	142,414*b*	113,619*b*	.....	23,874	113,199	88,422	.....
Apr.	70,699	50,103	162,282*b*	102,557*b*	.....	.....	.....	.....	.....

*Including liquid latex. †Stocks on hand the last of the month or year. ‡*Statistical Bulletin of the International Rubber Regulation Committee.* §Stocks at U. S. A., U. K., Singapore and Penang, Para, Manaos, regulated areas, and afloat. ¶Corrected to 100% from estimate of reported coverage. *a.* Not including stocks at French dealers. *b.* Includes government barter rubber.

THE R. M. A. estimates United States rubber manufacturers in April consumed 50,103 long tons of crude rubber, less than 1% under the March consumption of 50,192 long tons, but 10.7% above the 45,268 (revised) long tons for April, 1939.

Gross imports for April, as reported by the Department of Commerce, were 70,699 long tons, 19.3% above the March figure of 59,258 long tons and more than double the April, 1939, imports of 32,031 (revised) long tons.

Total domestic stocks on April 30 are estimated by the Association to be 162,282 long tons, 14% above the 142,414 (revised) long tons on hand March 31, but 13.7% below the 188,074 (revised) long tons on hand April 30, 1939.

Crude rubber afloat to U. S. ports on April 30 is estimated at 102,557 long tons, against 113,619 long tons on March 31, and 57,918 long tons afloat April 30, 1939.

The figure for U. S. stocks on April 30, 1940, includes 6,106 long tons of government emergency rubber. The amount of barter rubber afloat April 30 is not available for publication purposes.

Tennis

52-inch 1.35-yard ..... *yd.*	$0.18¼

Hollands

Gold Seal and Eagle

20-inch No. 72 ..... *yd.*	.10
30-inch No. 72	.18
40-inch No. 72	.20

Red Seal and Cardinal

20-inch ..... *yd.*	.08½
30-inch	.15¼
40-inch	.17
50-inch	.26

Osnaburgs

40-inch 2.34-yard ..... *yd.*	.09⅞
40-inch 2.48-yard	.09¼
40-inch 2.56-yard	.08⅜
40-inch 3.00-yard	.07⅞
40-inch 7-ounce part waste	.08⅜
40-inch 10-ounce part waste	.11⅝
37-inch 2.42-yard	.09½

Raincoat Fabrics

Cotton

Bombazine 60 x 64 ..... *yd.*	.07½
Plaids 60 x 48	.10¾
Surface prints 60 x 64	.11¾
Print cloth, 38½-inch, 60 x 64	.04¾

Sheetings, 40-Inch

48 x 48, 2.50-yard ..... *yd.*	.08⅛
64 x 68, 3.15-yard	.07¾
56 x 60, 3.60-yard	.07
44 x 40, 4.25-yard	.04⅞

Sheetings, 36-Inch

48 x 48, 5.00-yard ..... *yd.*	.04½
44 x 40, 6.15-yard	.03⅜

Tire Fabrics

Builder

17¼ ounce 60" 23/11 ply Karded peeler ..... *lb.*	.30½

Chafer

14 ounce 60" 20/8 ply Karded peeler ..... *lb.*	.30
9¼ ounce 60" 10/2 ply Karded peeler ..... *lb.*	.29½

Cord Fabrics

23/5/3 Karded peeler, 1/16" cotton ..... *lb.*	.31
15/3/3 Karded peeler, 1/16" cotton ..... *lb.*	.29
12/4/2 Karded peeler, 1/16" cotton ..... *lb.*	.28
23/5/3 Karded peeler, 1¼" cotton ..... *lb.*	.36½
23/5/3 Combed Egyptian ..... *lb.*	.50

Leno Breaker

8¼ ounce and 10¼ ounce 60" Karded peeler ..... *lb.*	.32½

Rubber and Canvas Footwear Statistics

	Thousands of Pairs		
	Inventory	Production	Shipments
1937	20,430	74,102	67,191
1938	16,183	50,812	54,942
1939	16,388	60,612	60,377
1940			
Jan.	15,018	5,044	6,389
Feb.	15,319	5,062	4,761
Mar.	15,656	4,869	4,532

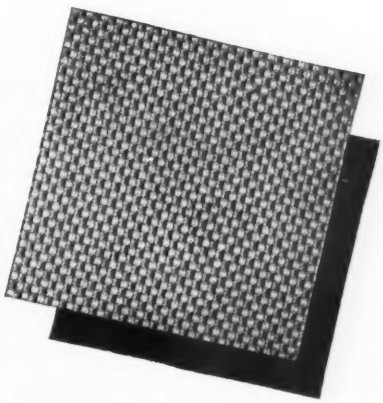
The above figures have been adjusted to represent 100% of the industry based on reports received which represented 81% for 1936-37.

Source: *Survey of Current Business*, Bureau of Foreign & Domestic Commerce, Washington, D. C.

This method of weaving used by the MBAMBA tribes in the Belgian Congo is ingenious but slow, and the fabric has many uncontrolled variations. It is not in tune with the times. Not so with the textile industry as we practice it. In addition to the weaving facilities of 20 modern mills producing over 25,000 fabrics—our organization includes modern laboratories, designed, built and equipped to furnish us with the most practical commercial textile laboratory facilities in America. Through the use of these facilities we have been able to maintain the constant research and development which enables us to keep our entire production in tune with the times.

FOR INSTANCE:

Warwick Balloon Cloth



This remarkably fine fabric demonstrates the results that can be obtained from the combination of expert craftsmanship, modern equipment and careful attention to every detail in the process of manufacture. Our textile engineers are always available to the Rubber Industry to aid in the development of special specification fabrics to meet unusual requirements.

WELLINGTON SEARS COMPANY, 65 Worth St., New York, N.Y.

CEYLON

Although latex consumption has been increasing in the large manufacturing centers, Ceylon, having made no serious effort to enter the latex market, in this respect is conspicuously behind Malaya and Netherland India. Recently M. W. Philpott[1] mentioned the special local factors which militate against successful production of latex in Ceylon. In comparison with Malaya, Ceylon has the following disadvantages: (1) The rainfall of Malaya is evenly distributed and causes relatively little interference with tapping, not the case in Ceylon. (2) For about three months in the year the collection of latex for shipment is not practical in Ceylon, a fact that must be taken into consideration in estimating production costs. (3) The estate units are small and at present not able to ship large uniform consignments for which the markets abroad are mainly interested. These obstacles, of course, are not unsurmountable; thus if estates adopted cooperative measures for bulking or a central latex factory were established in Colombo, Ceylon would be able to meet the requirements of British and American markets for large shipments.

However nearby British India appears to offer a suitable market for Ceylon latex. The Ceylon Research Scheme has received several inquiries in the last two years which indicate a growing demand for latex in India, mainly for making rubber gloves, balloons, and other dipped goods. Hitherto requests for latex have as far as possible been met by shipments from Dartonfield, but it is already clear that the demand in India is much larger than the Research Scheme can supply.

In considering the most desirable type of latex for Ceylon to produce, Mr. Philpott points to concentrated latex, emphasizing that despite the drop in total latex production in 1938, Malayan exports of concentrated latex that year were higher than ever. In 1935 Malaya shipped 2,374 tons of latex with D.R.C. over 5.7 pounds per gallon; in 1936, 3,086 tons; in 1937, 4,774 tons; and in 1938, 6,747 tons.

Mr. Philpott further calls attention to the fact that the latex preserving and concentrating installations can readily be adapted to produce purified rubber, for which there is a growing demand.

[1] "Latex Shipment." Rubber Research Scheme, Ceylon, combined third and fourth quarterly circulars for 1939, pp. 125-33.

INDO-CHINA

An exceptional war tax on rubber exports from Indo-China, effective January 1, 1940, was decreed December 19, 1939. A later decree, also effective January 1, 1940, and published January 10, 1940, somewhat modifies the basis of calculating this tax, which is in addition to the export duty and the cess levied for rubber control purposes. The revised order now provides that the tax is to be computed each month on the basis of the difference between the last Singapore quotation before the outbreak of hostilities on 1-X RSS spot, loose godown rubber (1-X smoked sheets available and stored in bulk in a Singapore godown), and the average monthly Singapore quotation on the same quality during the preceding month. For purposes of the decree, the last pre-war price quoted in Singapore for the above quality of rubber, (as converted into piasters per kilo) is fixed at 1.3893 piasters per kilo (one piaster equals 10 French francs). For the month of January, 1940, the tax worked out at 0.16 piasters (1.6 francs) per net kilo.

THAILAND

Rubber exports from Thailand in 1938 totaled 41,618 long tons and 41,266 long tons in 1939; most of which is shipped to British Malaya for further distribution. Available data appear to indicate that this rubber was produced chiefly by small holdings. At the end of 1939 there were reported in all 89 rubber estates with individual areas of over 160 acres and a total estimated area of 30,000 acres. This can obviously be but a fraction of the total acreage under *Hevea* in Thailand.

DENMARK

In 1939, Denmark imported 29,387 quintals of crude rubber against 29,236 quintals the year before. Her imports of rubber manufactures included automobile tires, 24,185 against 22,013 quintals; cycle tires, 2,939 against 2,550 quintals; rubber bands and similar articles, 1,676 against 1,282 quintals; balata belting, 686 against 664 quintals; unspecified rubber goods, 9,952 against 9,539 quintals; hard rubber goods, 354 against 368 quintals.

U. S. Crude and Waste Rubber Imports for 1940

	Plantations	Latex	Paras	Africans	Centrals	Guayule	Totals 1940	Totals 1939	Balata	Miscellaneous	Waste
Jan .....*tons*	68,832	2,768	406	161	74	255	72,496	39,082	107	648	241
Feb.	40,338	1,458	553	453	30	256	43,088	36,490	75	316	34
Mar.	56,008	2,720	119	49	42	320	59,258	38,989	89	659	26
Apr.	66,688	3,219	374	97	12	309	70,699	29,601	63	581	8
Total 4 mos., 1940 .....*tons*	231,866	10,165	1,452	760	158	1,140	245,541	.....	334	2,204	309
Total 4 mos., 1939 .....*tons*	135,282	5,653	1,515	754	17	941	.....	144,162	204	2,412	657

Compiled from The Rubber Manufacturers Association, Inc., statistics.

World Net Imports of Crude Rubber—Long Tons

Year	U.S.A.	U.K.†	Argentine	Australia	Belgium	Canada	France	Greater Germany‡	Italy	Japan	Poland	Sweden	U.S.S.R.	Rest of World	Total
1938...	406,300	168,172	7,700	12,300	11,300	25,700	58,100	107,900	28,200	46,300	7,900	8,300	26,800	49,200	928,000
1939...	486,348	....	9,552	15,315*	9,593	32,508	....	....	....	42,351	....	....	....	60,820	....
1939															
Jan. ..	36,614	7,121	417	954	898	2,867	4,694	9,095	2,133	2,553	665	643	4,000*	4,282	70,651
Feb. ..	30,578	8,087	1,092	1,785	1,068	1,451	5,327	8,348	2,025	3,263	709	467	1,000*	4,824	66,710
Mar. ..	45,286	12,092	440	1,324	1,242	2,458	4,503	9,028	1,525	4,019	985	581	2,000*	4,901	86,374
Apr. ..	31,590	7,129	786	1,138	855	1,559	5,650	9,316	1,926	3,579	673	994	2,000*	4,614	69,432
May ..	45,390	10,488	353	1,202	792	3,069	4,646	9,031	1,573	4,438	940	1,047	1,000*	5,818	86,830
June ..	33,950	10,287	965	1,348	621	2,465	4,649	8,677	1,992	3,067	693	2,252	500*	4,800	74,295
July ..	36,932	6,205	983	1,472	836	3,214	4,282	8,849	1,408	3,668	750*	644	1,000*	4,541	72,520
Aug. ..	38,319	9,391	619	2,182	952	2,187	....	....	....	3,146	....	1,057	2,500*	5,286	77,030
Sept. ..	36,197	....	965	875	108	2,639	....	....	....	2,801	....	280	....	4,819	....
Oct. ..	39,735	....	562	1,335	519	5,787	....	....	....	2,749	....	....	....	4,613	....
Nov. ..	41,478	....	359	900*	667	1,709	....	....	....	5,106	....	....	....	5,471	....
Dec. ..	70,279	....	2,011	800*	1,035	3,103	....	....	....	3,962	....	....	....	6,851	....
1940															
Jan. ..	71,541	....	1,049	1,000*	891	5,047	....	....	....	4,547	....	....	....	....	....
Feb. ..	41,797	....	....	....	694	3,508	....	....	....	....	....	....	....	....	....

* Estimated. †U. K. figures show gross imports, not net imports. ‡Including imports of Austria and Czechoslovakia. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.00 per line (ten words)	Light face type 40c per line (ten words)	Light face type 75c per line (ten words)
Bold face type $1.25 per line (eight words)	Bold face type 55c per line (eight words)	Bold face type $1.00 per line (eight words)

Allow nine words for keyed address. *Replies forwarded without charge.*

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CHEMIST WITH 22 YEARS' VARIED LABORATORY EXPERIence in analysis, compounding, testing, and reclaiming rubber. Also preparation and evaluation of mineral fillers. Address Box No. 107, care of INDIA RUBBER WORLD.

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FOR SALE: PLANT AND EQUIPMENT FOR SATUrating absorbent papers for production of artificial leathers and substitutes for the shoe trade—well-located going concern. Technical information included in sale. Address Box No. 106, care of INDIA RUBBER WORLD.

MANUFACTURER'S AGENT WITH OLD WELLestablished organization desires on commission basis products applicable to shoe manufacturers. Has branches of long standing in Boston, New York, Baltimore, Cincinnati, Milwaukee, and St. Louis. Address Box No. 109, care of INDIA RUBBER WORLD.

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Lea Bridge Rubber Works Ltd.
Lea Bridge,
London,
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ENGLAND.

(*Advertisements continued on page* 91)

United States Statistics

Imports for Consumption of Crude and Manufactured Rubber

	February, 1940 Quantity	February, 1940 Value	Two Months Ended February, 1940 Quantity	Two Months Ended February, 1940 Value
UNMANUFACTURED—*Free*				
Liquid latex (solids)....*lb.*	4,862,684	$947,524	12,555,824	$2,360,252
Jelutong or pontianak....*lb.*	1,031,655	134,878	2,402,658	290,448
Balata ....*lb.*	122,668	26,420	197,912	45,898
Gutta percha ....*lb.*	250,634	44,970	588,699	98,420
Guayule ....*lb.*	703,200	70,251	989,800	98,152
Scrap and reclaimed....*lb.*	883,448	13,151	1,537,041	30,849
Totals	7,854,289	$1,237,194	18,271,934	$2,924,019
Misc. rubber (above), 1,000 *lbs.*	7,854	$1,237,194	18,272	$2,924,019
Crude rubber....1,000 *lbs.*	90,951	15,578,517	245,416	41,893,017
Totals ....1,000 *lbs.*	98,805	$16,815,711	263,688	$44,817,036
Chicle, crude ....*lb.*	1,235,176	$395,991	3,308,671	$1,069,789
MANUFACTURED—*Dutiable*				
Rubber tires ....*no.*	2,989	$43,536	11,397	$68,889
Rubber boots, shoes and overshoes ....*prs.*	1,829	405	8,154	1,811
Rubber soled footwear with fabric uppers ....*prs.*	101,304	11,646	174,242	23,551
Golf balls ....*no.*	60,192	5,930	90,768	8,080
Lawn tennis balls....*no.*	102,768	10,275	237,348	20,383
Other rubber balls....*no.*	145,416	5,681	511,382	20,420
Other rubber toys....*lb.*	.....	3,858	.....	8,345
Hard rubber combs....*no.*	.....	.....	.....	.....
Other manufactures of hard rubber	.....	391	.....	4,867
Friction or insulating tape.*lb.*	12,032	3,538	15,071	6,366
Belts, hose, packing, and insulating material	.....	8,432	.....	27,303
Druggists' sundries of soft rubber	.....	5,289	.....	6,353
Inflatable swimming belts, floats, etc. ....*no.*	106,278	7,605	262,226	17,188
Other rubber and gutta percha manufactures	.....	17,679	.....	39,072
Totals	.....	$124,265	.....	$252,628

Exports of Foreign Merchandise

RUBBER AND MANUFACTURES				
Crude rubber ....*lb.*	2,891,737	$599,819	5,031,666	$1,047,492
Balata ....*lb.*	137,879	37,985	177,404	50,306
Other rubber, rubber substitutes and scrap....*lb.*	.....	.....	2,236	313
Rubber manufactures (including toys)	.....	904	.....	5,592
Totals	.....	$638,708	.....	$1,103,703

Exports of Domestic Merchandise

RUBBER AND MANUFACTURES				
Reclaimed ....*lb.*	3,216,315	$165,037	5,587,722	$290,951
Scrap ....*lb.*	6,116,700	124,620	12,674,784	229,385
Cements ....*gal.*	29,965	41,825	58,027	73,807
Rubberized auto cloth.*sq. yd.*	25,875	11,750	44,365	21,786
Other rubberized piece goods and hospital sheeting.*sq. yd.*	233,775	77,572	381,901	129,336
Boots ....*prs.*	42,755	77,987	55,219	111,398
Shoes ....*prs.*	21,901	14,502	31,047	20,739
Canvas shoes with rubber soles ....*prs.*	31,463	25,646	61,805	48,699
Soles ....*doz. prs.*	3,699	6,561	6,803	12,265
Heels ....*doz. prs.*	23,034	14,489	53,509	34,154
Soling and top lift sheets.*lb.*	127,995	21,547	236,467	40,595
Gloves and mittens..*doz. prs.*	16,101	31,497	27,554	59,247
Water bottles and fountain syringes ....*no.*	14,908	5,498	42,698	15,100
Other druggists' sundries...	.....	76,800	.....	139,954
Gum rubber clothing....*doz.*	15,161	40,738	27,917	68,109
Balloons ....*gross*	21,262	20,977	40,681	37,236
Toys and balls	.....	6,267	.....	14,095
Bathing caps ....*doz.*	4,395	9,307	7,483	15,323
Bands ....*lbs.*	15,929	9,066	41,206	21,496
Erasers ....*lb.*	23,055	14,687	46,797	28,003
Hard rubber goods				
Electrical battery boxes.*no.*	26,583	19,997	56,026	40,066
Other electrical....*lb.*	52,333	23,256	85,818	36,409
Combs, finished ....*doz.*	11,369	6,915	29,416	15,881
Other hard rubber goods...	.....	18,036	.....	27,143
Tires				
Truck and bus casings.*no.*	31,992	660,749	72,900	1,504,039
Other auto casings....*no.*	54,196	600,922	108,312	1,205,010
Tubes, auto ....*no.*	61,054	120,223	130,741	241,746
Other casings and tubes.*no.*	5,738	38,257	12,766	74,389
Solid tires for automobiles and motor trucks....*no.*	59	1,947	931	21,882
Other solid tires....*lb.*	41,475	5,156	53,470	8,855
Tire sundries and repair materials ....*lb.*	310,720	84,975	497,113	144,051
Rubber and friction tape..*lb.*	61,761	17,193	166,209	44,125
Fan belts for automobiles.*lb.*	33,639	16,717	82,540	42,190
Other rubber and balata belts ....*lb.*	330,613	169,266	754,116	378,995
Garden hose ....*lb.*	72,377	11,157	172,924	29,037
Other hose and tubing....*lb.*	666,576	259,154	1,750,496	689,828
Packing ....*lb.*	90,484	45,784	246,617	118,547
Mats, matting, flooring, and tiling ....*lb.*	100,350	13,079	212,989	28,437
Thread ....*lb.*	120,300	87,460	202,412	146,547
Gutta percha manufactures.*lb.*	104,545	30,841	295,821	87,384
Latex (d.r.c.) and rubber sheets processed for further manufacture....*lb.*	76,836	14,964	129,728	27,680
Other rubber manufactures..	.....	166,994	.....	349,133
Totals	.....	$3,209,415	.....	$6,673,052

Rubber Trade Inquiries

The inquiries below are of interest not only in showing the needs of the trade, but because additional information may be furnished by readers. The Editor is glad to have those interested communicate with him.

No.	INQUIRY
2757	Manufacturers of rubber cement for sealing the air chamber of a heel without any buffing.
2758	Manufacturers of filter presses.
2759	Manufacturers of molds and machinery for latex dipped goods.
2760	Suppliers of blowing pellets.
2761	Manufacturers of porcelain glove dipping molds.
2762	Manufacturers of rubber molds for use in the ceramic industries.
2763	Manufacturers of rubber bands cut from old inner tubes.
2764	Manufacturers of essential machines for washing crude rubber.
2765	Manufacturers of maroon glace cotton for braiding cables.
2766	Manufacturers of automatic windup to wind braided hose on a pan in a helical coil.
2767	Manufacturer of Easy Tread or Tread Ease.

Foreign Trade Information

***For further information concerning the inquiries listed below address United States Department of Commerce, Bureau of Foreign and Domestic** Commerce, Room 734, Custom House, New York, N. Y.*

No.	COMMODITY	CITY AND COUNTRY
† 10	Gum tragacanth powder, gum arabic, gum copal, gum lac, gum myrrh....	Seville, Spain
*7078	Raincoats	Manila, Philippine Islands
†7105	Tennis balls, rackets, and balloons....	Leopoldville, Belgian Congo
‡7108	Dental and surgical supplies.....	Capetown, South Africa
‡7113	Baby pacifiers	Singapore, S. S.
*7114	Rubber thread	Buenos Aires, Argentina
*7115	Tires, automobile accessories, and tools	Durban, South Africa
‡7127	Wiring accessories	Cairo, Egypt
*7139	Chewing gum	Alexandria, Egypt
‡7159	Hospital rubber goods and supplies....	Stockholm, Sweden
*7150	Automobile specialties	Habana, Cuba
*7163	Druggists' sundries	Alexandria, Egypt

*Agency. †Purchase. ‡Purchase and agency.

Dividends Declared

COMPANY	STOCK	RATE	PAYABLE	STOCK OF RECORD
Armstrong Cork Co.....	Com.	$0.25	June 1	May 16
Armstrong Cork Co.....	Pfd.	$1.00	June 15	June 1
Belden Mfg. Co.....	Com.	$0.20 q.	June 1	May 17
Boston Woven Hose & Rubber Co.	Com.	$0.50	June 15	June 1
	Pfd.	$3.00 s.	June 15	June 1
Brunswick-Balke-Collender Co.	Com.	$0.50	June 15	June 5
Canada Wire & Cable Co., Ltd.	Com.	$0.25	June 15	May 31
	Pfd.	$1.625 q.	June 15	May 31
Collins & Aikman Corp.....	Com.	$0.25	June 1	May 21
Crown Cork & Seal, Ltd...	Com.	$0.40 q.	May 15	Apr. 30
Dayton Rubber Mfg. Co....	Com.	$0.25	June 5	May 25
Dunlop Rubber Co., Ltd.....	ADR 29	$0.001 final	May 14	.....
Electric Storage Battery Co.	Com.	$0.50 q.	June 29	June 8
Electric Storage Battery Co.	Pt. Pfd.	$0.50 q.	June 29	June 8
Firestone Tire & Rubber Co.	Pfd.	$1.50 q.	June 1	May 15
Ford Motor Co.....	"A & B"	$0.25 q.	June 15	May 25
General Motors Corp.....	Com.	$1.00 irreg.	June 12	May 16
General Motors Corp.....	Pfd.	$1.25 q.	Aug. 1	July 8
Goodyear Tire & Rubber Co.	Com.	$0.25 q.	June 15	May 15
Goodyear Tire & Rubber Co.	$5 Pfd.	$1.25 q.	June 15	May 15
Phelps Dodge Copper Corp..	Com.	$0.25	June 10	May 24
Raybestos-Manhattan, Inc...	Com.	$0.25 q.	June 15	May 31
United States Rubber Co....	8% Non-Cum. Pfd.	$2.00	June 21	June 7
Westinghouse Electric & Mfg. Co.	Com.	$0.875	May 29	May 7
	Pt. Pfd.	$0.875	May 29	May 7

Imports by Customs Districts

	March, 1940 *Crude Rubber Pounds	March, 1940 *Crude Rubber Value	March, 1939 *Crude Rubber Pounds	March, 1939 *Crude Rubber Value
Massachusetts	11,474,163	$2,113,192	11,588,206	$1,918,000
Buffalo	67,200	12,894	.....	.....
New York	84,521,675	14,952,651	63,191,973	9,795,075
Philadelphia	1,981,191	345,146	1,223,496	185,642
Maryland	6,414,515	1,097,871	1,067,568	150,359
Virginia	78,133	14,509	.....	.....
Georgia	.....	.....	1,617,752	239,967
Mobile	668,288	106,865	519,906	76,994
New Orleans	8,812,081	1,492,401	3,918,393	584,559
Galveston	.....	.....	44,880	6,916
El Paso	99,000	9,722	133,000	2,613
Los Angeles	16,406,688	2,869,711	18,181,398	2,727,337
San Francisco	740,674	135,625	919,218	138,977
Oregon	13,440	2,890	16,800	2,662
Ohio	899,904	158,839	.....	.....
Colorado	560,000	87,211	.....	.....
Totals	132,736,952	$23,399,527	102,422,510	$15,829,101

*Crude rubber including latex dry rubber content.

Classified Advertisements

Continued

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Dominion of Canada Statistics

Imports of Crude and Manufactured Rubber

	January, 1940		January, 1939		February, 1940		Two Months Ended February, 1940	
UNMANUFACTURED	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Crude rubber, etc. ..... lb.	11,259,546	$2,263,930	6,423,123	$984,403	7,515,159	$1,523,623	18,774,705	$3,787,553
Latex (dry weight) ..... lb.	45,681	17,287	*	*	342,545	91,136	388,226	108,423
Gutta percha ..... lb.	.....	.....	2,526	1,810	2,859	1,964	2,859	1,964
Rubber, recovered ..... lb.	1,121,700	62,999	926,600	48,913	978,100	51,401	2,099,800	114,400
Rubber, powdered, and gutta percha scrap ..... lb.	601,200	11,933	463,700	9,802	498,300	11,495	1,099,500	23,428
Balata ..... lb.	.....	.....	.....	.....	535	327	535	327
Rubber substitute ..... lb.	30,700	10,848	23,800	5,954	28,400	6,718	59,100	17,566
Totals	13,058,827	$2,366,997	7,839,749	$1,050,882	9,365,898	$1,686,664	22,424,725	$4,053,661
PARTLY MANUFACTURED								
Hard rubber comb blanks	.....	$1,358	.....	$930	.....	$2,092	.....	$3,450
Hard rubber, n. o. s. ..... lb.	2,300	1,931	967	1,017	4,910	4,479	7,210	6,410
Rubber thread not covered ..... lb.	4,467	4,722	2,372	1,550	3,866	4,179	8,333	8,901
Totals	6,767	$8,011	3,339	$3,497	8,776	$10,750	15,543	$18,761
MANUFACTURED								
Bathing shoes ..... pairs	144	$27	4	$2	.....	.....	144	$27
Belting	.....	9,697	.....	6,463	.....	$17,651	.....	27,348
Hose	.....	15,042	.....	8,734	.....	11,906	.....	26,948
Packing	.....	6,826	.....	3,099	.....	7,381	.....	14,207
Boots and shoes ..... pairs	657	297	6,234	4,997	834	2,284	1,491	2,581
Canvas shoes with rubber soles ..... pairs	1,320	350	.....	.....	15	31	1,335	381
Clothing, including waterproofed	.....	2,179	.....	2,224	.....	2,605	.....	4,784
Raincoats ..... number	502	2,945	389	1,103	1,463	3,773	1,965	6,718
Gloves ..... dozen pairs	674	2,682	530	1,547	504	1,439	1,178	4,121
Hot water bottles	.....	826	.....	336	.....	66	.....	892
Liquid rubber compound	.....	13,541	.....	.....	.....	31,707	.....	45,248
Tires, bicycle ..... number	4,755	2,562	7,751	3,404	7,085	4,385	11,840	6,947
Pneumatic ..... number	1,600	17,892	1,069	15,052	1,098	16,294	2,698	34,186
Solid for automobiles and motor trucks ..... number	68	1,653	8	583	44	781	112	2,434
Other solid tires	.....	1,068	.....	991	.....	832	.....	1,900
Inner tubes ..... number	904	2,046	98	358	144	440	1,048	2,486
Bicycle ..... number	4,835	946	†	†	4,687	1,129	9,522	2,075
Mats and matting	.....	8,104	.....	5,248	.....	6,971	.....	15,075
Cement	.....	11,060	.....	2,724	.....	9,286	.....	20,346
Golf balls ..... dozens	958	1,683	16	23	240	682	1,198	2,365
Heels ..... pairs	2,723	171	1,563	109	9,755	935	12,478	1,106
Other rubber manufactures	.....	153,967	.....	102,700	.....	165,166	.....	319,133
Totals	.....	$255,564	.....	$159,697	.....	$285,744	.....	$541,308
Totals, rubber imports	.....	$2,630,572	.....	$1,214,076	.....	$1,983,158	.....	$4,613,730

Exports of Domestic and Foreign Rubber Goods

	Produce of Canada Value	Reexports of Foreign Goods Value	Produce of Canada Value	Reexports of Foreign Goods Value	Produce of Canada Value	Reexports of Foreign Goods Value	Produce of Canada Value	Reexports of Foreign Goods Value
UNMANUFACTURED								
Waste rubber	$8,558	.....	$4,282	.....	$18,451	.....	$27,009	.....
MANUFACTURED								
Belting	$51,719	.....	$72,497	.....	$54,727	.....	$106,446	.....
Bathing caps	.....	.....	.....	.....	10	.....	10	.....
Canvas shoes with rubber soles	32,052	.....	36,653	.....	62,298	.....	94,350	.....
Boots and shoes	727,822	.....	315,669	.....	240,769	.....	968,591	.....
Clothing, including waterproofed	31,969	.....	28,437	.....	36,055	.....	68,024	.....
Heels	4,727	.....	11,185	.....	21,814	.....	26,541	.....
Hose	55,195	.....	16,653	.....	25,291	.....	80,486	.....
Soles	5,184	.....	12,001	.....	25,045	.....	30,229	.....
Soling slabs	2,074	.....	.....	.....	8,270	.....	10,344	.....
Tires, pneumatic	636,529	.....	716,811	.....	501,875	.....	1,138,404	.....
Not otherwise provided for	.....	.....	.....	.....	17	.....	17	.....
Inner tubes	46,420	.....	62,935	.....	39,837	.....	86,257	.....
Other rubber manufactures	49,772	$2,723	69,357	$1,078	64,264	$7,408	114,036	$10,131
Totals	$1,643,463	$2,723	$1,342,198	$1,078	$1,080,272	$7,408	$2,723,735	$10,131
Totals, rubber exports	$1,652,021	$2,723	$1,346,480	$1,078	$1,098,723	$7,408	$2,750,744	$10,131

*Included in figure for crude rubber. †Included in figure for bicycle tires.

Shipments of Crude Rubber from Producing Countries—Long Tons

Year	Malaya including Brunei and Labuan	N.E.I.	Ceylon	India	Burma	North Borneo	Sarawak	Thailand	French Indo-China	Total	Philippines and Oceania	Liberia†	Other Africa	South America	Mexican Guayule	Grand Total
1938.....	372,000	298,100	49,500	8,500	6,700	9,500	17,800	41,600	59,200	862,900	2,000*	2,900	9,000*	15,300	2,800	894,900
1939.....	376,755	371,946	61,028	9,241	6,616	11,864	24,014	41,266	65,219	967,949	2,080*	5,935	9,600*	16,094	2,857	1,004,515
1939																
Jan.	24,393	38,680	7,237	764	1,115	1,604	2,342	2,918	4,532	83,585	220	528	800	1,812	347	87,292
Feb.	29,278	24,996	5,495	947	618	664	1,484	5,606	5,293	74,381	158	435	800	1,187	319	77,280
Mar.	29,298	27,933	3,718	773	619	344	1,177	5,401	4,501	73,764	230	427	800	1,407	210	76,838
Apr.	29,779	28,338	2,225	881	379	1,687	2,446	2,660	2,657	71,052	135	533	800	1,206	167	73,893
May	29,398	24,429	2,805	1,002	668	558	1,649	2,782	4,584	68,075	129	500*	800	1,077	231	70,812
June	22,052	27,510	3,707	630	805	332	1,157	1,748	4,663	62,604	140	667	800	676	166	65,053
July	26,013	35,679	5,019	782	503	1,603	3,092	5,599	3,367	81,657	190	516	800	1,071	264	84,498
Aug.	40,973	27,477	5,620	203	213	975	1,749	5,230	7,020	89,460	234	222	800	1,313	378	92,407
Sept.	26,908	37,755	6,064	691	89	429	1,932	4,670	5,943	84,481	94	599	800	1,356	46	87,376
Oct.	49,458	44,998	5,234	665	150	1,730	2,487	2,047	5,022	111,791	122	561	800	1,524	356	115,154
Nov.	35,773	30,234	4,402	370	449	1,322	2,023	1,428	6,540	82,541	254	614	800	1,198	137	85,544
Dec.	33,232	23,917	9,502	1,533	1,008	616	2,476	1,177	11,097	84,558	174	333	800	2,267	236†	88,368
1940																
Jan.	26,229	54,148	7,698	839	833	1,858	2,256	5,722	5,238	104,821	115	1,191	900	1,550	128†	108,705
Feb.	45,651	37,985	8,946	1,184*	892	1,164	2,678	4,307	6,931	109,738	94	477	900	1,662	314†	113,185
Mar.	47,885	43,335	5,305	1,183*	871	1,050	3,526	3,111	3,551	109,817	200*	600*	900	1,482	200*	113,199

*Estimated. †Guayule rubber imports into U.S.A. provisional until export figures from Mexico are received. Source: *Statistical Bulletin of the International Rubber Regulation Committee.*